4

LAUNCHING THE INITIATIVE

"A journey of a thousand miles must begin with a single step."

—Lao Tzu

Chapter 3 provided an overall deployment process for Six Sigma, based on the case studies from Chapter 2. We will now delve into the first phase of the deployment process, a step referred to as launching the initiative. This is probably the most important phase. If Six Sigma is poorly launched it will be very difficult to reorganize and regain momentum. People will have already become skeptical, and resisters will have ammunition. Taking into full consideration the key points discussed in the chapter will help organizations hit the ground running on their initial implementation.

We define the launch phase of Six Sigma to be roughly the period between making the decision to deploy Six Sigma, and completion of the initial wave of Black Belt training. At the end of this phase you should have in place:

- An overall deployment plan (strategy)
- The initial wave of projects
- Trained Black Belts, and other key players

These are the key "deliverables" for the launch phase and they should be considered in that order. Before developing the deployment plan most organizations need to address the key preliminary question of which major deployment strategy to utilize. This decision will affect virtually every aspect of the deployment plan, so it will be addressed first, followed by the three main launch topics. The chapter will be completed with an overall summary of the launching the initiative phase.

Full or Partial Deployment?

Once organizations have decided to implement Six Sigma they are faced with the question of "how do I get started?" The most obvious answer is to adopt the approach of companies like GE and W. R. Grace and institute a CEO-led, company wide, top priority initiative. We believe that this kind of "full deployment" is the best strategy. The advantages and disadvantages of a full deployment approach are listed in Table 4-1.

Unfortunately, many business leaders below the CEO level are not in a position to take the full deployment approach. Another option is for

TABLE 4-1 Full Versus Partial Deployment

Full Deployment	Partial Deployment
Strengths	**Strengths**
• The organization knows what is going on	• Requires limited resources
• Vision and direction are clear	• Requires limited management attention
• Resources are more easily assigned	• Can be started by middle management
• Returns are large and come in the first 6-8 months	Easy to get started
Limitations	**Limitations**
• Top management commitment is required up front to get started	• Difficult to get:
• Priorities have to be redefined to include the Six Sigma work	• BB assigned full time
• Management will have to change how they work	• Functional resources to support BB
	• Tough to get management attention
	• Organization doesn't believe management is committed to Six Sigma
	• Returns are small because only a few BB are involved

leaders to deploy Six Sigma in their own realm of responsibility. This could be a division, business unit, or even a single plant. We refer to deployment on such a reduced scale as partial deployment. While this is not our first option, it may be the only practical one. Keep in mind, however, that Six Sigma will only flourish in the long term if it becomes a full deployment process. Sooner or later someone will squash a partial deployment if it does not spread to the rest of the organization. For that reason, the main objective of a partial deployment must be to make a convincing case for full deployment.

Partial deployment usually involves training one to five Black Belts and using their tangible results to make the case for full deployment. It takes little to get started, but if proper planning is not done and adequate resources are not assigned the effort can quickly run into trouble.

The result in the case of Royal Chemicals is discussed in Chapter 2. The strengths and limitations of partial deployment are also summarized in Table 4-1. Snee and Parikh (2001) report on one successful partial deployment of Six Sigma at Crompton Corporation, a chemical company based in Greenwich, CT. In the first wave seven Black Belts were trained and were given good support. One Black Belt was reassigned and his project postponed. The other six projects were completed, returning an average of $360,000 in savings per project.

These results encouraged a key business unit of Crompton Corporation to pursue a partial deployment on a much larger scale. This deployment was supported with Executive, Champion, and Site Leadership training and produced project savings similar to those of the initial six projects. Building on this success, the whole Crompton Corporation began a full Six Sigma deployment. The process of moving from partial deployment to full corporate deployment took approximately 18 months. Recall that the ultimate measure of success for partial deployment is that it leads to a successful full deployment. Contrary to popular belief, partial deployment requires more than just good Black Belt training to be successful. Executive, Champion, and Leadership training, as well as good project and people selection are also needed.

Those selecting the partial deployment route should be aware of the problems that they can expect to encounter. The biggest problems include identifying good projects for the Black Belts, getting Black Belts assigned full time, and assigning Champions who will provide good guidance for the Black Belts, including weekly reviews of the projects. It is sometimes difficult to get functional group support for the projects when the organization is not pursuing full deployment of Six Sigma. The completion of the Executive, Champion, and Leadership training helps ensure that these problems are minimized.

The partial deployment approach is most likely to succeed when all of the deployment plan elements for the full deployment are addressed. In other words, success is most likely when partial deployment is essentially a full deployment in one area, and looks just like a full deployment to those working in this area. This considered, many feel that to do the partial deployment well takes almost as much effort as doing a full deployment with not nearly the return. This leads some, including the authors, to conclude that full deployment is overall a better use of resources, and also increases the probability of success.

Developing the Deployment Plan

While there is usually a strong desire to launch Six Sigma as quickly as possible once the decision to deploy has been made, there is significant risk in taking a ready, fire, aim approach if proper planning is not done up front. Our experience is that one truly needs to begin with the end in mind when deploying Six Sigma. In other words, before you launch you should have a good idea of the long-term direction. Once the long-term strategy is set, it will be much easier to develop a short-term implementation process that will take you in the right direction. The long-term strategy is referred to as the deployment plan. Of course, this does not need to be developed in minute detail. You will simply need enough specificity to guide implementation. You will continually reevaluate, update, and add detail to this deployment plan as you move through the four phases of Six Sigma deployment.

The deployment plan should cover, at a minimum, all the elements listed on the following page. A real example of a typical (not necessarily best practice) deployment plan is given in the appendix. As noted, these elements are implemented not all at once, but rather in a phased approach. Think of the deployment plan as a work in progress. The key elements of the deployment plan during the launch phase are:

- Executive and Business Leadership workshops
- Champion workshop
- Selection of initial projects
- Selection of initial Black Belts and other key roles
- Finance personnel training
- Black Belt and Green Belt training

We consider these elements of the deployment plan to comprise an implementation or launch process, which is the focus of this chapter. Other elements of the deployment plan will be documented at a strategic level now, but details and actual implementation will come during the subsequent phases of deployment.

Our experience has been that most organizations are not ready to develop a proper deployment plan without more detailed understanding of Six Sigma, and facilitation from someone experienced in Six Sigma. For this reason we strongly recommend leadership workshops to develop this more detailed understanding, and to begin development of the deployment plan. Interestingly, the first draft of the deployment plan will be developed during the Executive and Business Leadership workshops, and then be used to guide development of the other elements of the implementation process. So there is somewhat of a chicken and egg relationship between the implementation process and the deployment plan. The implementation process is needed to develop the deployment plan, but in reality the implementation process is a subset of the deployment plan.

Required Deployment Plan Elements

- Strategy and Goals for Six Sigma
- Process Performance Measures
- Project Selection Criteria
- Project Identification/Prioritization System
- Deployment Processes for Champions, MBBs, BBs, etc.
- Roles of Management, Champions, MBBs, BBs and Functional Groups
- Curricula and Training System
- Project and Six Sigma Initiative Review Schedule
- Project Reporting and Tracking System
- Audit System for Previously Closed Projects
- Reward and Recognition Plan
- Communication Plan

This chapter will focus on how to organize and conduct the workshops that develop the first draft of the deployment plan with emphasis on

elements that are critical to the initial launch of Six Sigma. The other aspects of this plan will be discussed in detail in Chapters 5 and 6, since they become critical in the later stages of Six Sigma deployment.

The Executive workshop should include all members of the executive team since they all have a role to play in Six Sigma deployment. This holds even if the initiative will involve manufacturing or operations only in the beginning of a partial deployment. All parties are needed to make Six Sigma successful regardless of the initial focus of the effort. In particular it is important that the heads of the finance, human resources (HR), and information technology (IT) organizations participate in the Executive workshop and subsequent Six Sigma deployment.

These are three new players not typically involved in previous improvement approaches, such as TQM or quality circles. Finance has the responsibility for determining the bottom line impact of the projects and creating the project tracking system that will be used to monitor the tangible results of the effort. HR is responsible for the career development paths of the Champions, Master Black Belts (MBBs), Black Belts, and Green Belts, as well as reward and recognition systems, communication vehicles, and performance management systems. IT will be needed to develop computer systems that collect key process measurement data identified by the Black Belt projects, to improve the cycle time and accuracy of manual systems through digitization, or to automate improvements as part of the project control plan.

While some data acquisition systems may already be in place, Six Sigma projects often uncover other process measurements that are needed to improve and effectively control the process. Quite frequently information systems have been put in place for financial (accounting) purposes, rather than to aid continuous improvement. Achieving this new purpose often requires new data acquisition systems.

The Executive workshop is typically two days in length and has as its products:

- More in-depth understanding of Six Sigma
- Defined roles of the members of the management team
- Identification of targeted areas for improvement
- Champions for these targeted areas
- A draft deployment plan

The first version of the deployment plan is finalized in the following weeks by the management team as a regular part of their management meetings. A key part of this work is the refinement of the list of project areas and associated Champions. In large organizations it is often appropriate to give the two-day Executive workshop not only for the corporate executives, but also for the leaders of the different strategic business units (SBUs). In such cases the focus of these additional workshops is on the Six Sigma deployment plan within each SBU.

The SBU leaders often attend the original Executive workshop to learn about the process, and then assume leadership roles in the SBU-specific workshops. Similarly, it is important to do Site or Functional Leadership training for the management teams in the areas (plant site, functional group, etc.) that are targeted for the initial projects. This ensures that the Black Belts get the support that they need to complete their projects in a timely fashion. The Site or Functional Leadership training should be completed prior to the first week of Black Belt training.

The Executive workshop is followed in approximately one month by a three-to-five day Champion workshop for the Champions identified during the Executive workshop. This workshop uses as input the initial deployment plan and the project areas that were outputs of the Executive workshop, and refined in subsequent weeks. The outputs of the Champion workshop include deeper understanding of Six Sigma and the roles of the players, a list of chartered projects, and assigned Black Belts. Special attention is focused on the role of the Champion and the way the Champion interfaces with the Black Belts and Green Belts.

This workshop is particularly important because inactive or ineffective Champions are often identified as the root cause of project failures. If this role is not taken seriously, or not properly understood, the Champions can become the weak link in the Six Sigma organization, with devastating consequences.

After their Champion workshop, the Champions meet with the Black Belts to discuss the projects and make any needed refinements. Such refinements are often needed because the Black Belts have detailed data and insights that were not available when the project charters were developed. Project charters will be discussed in greater detail shortly. The Black Belts are now ready to attend their training, which usually follows the Champion workshop by approximately one month. The Black Belts are expected to bring their project charters to the training, and work on their actual projects as part of the training. They will learn and deliver results at the

same time. Such an approach is consistent with the principles of adult learning. We will now take a short detour to look at the elements of the deployment plan, and then come back to Black Belt training and the rest of the implementation process.

Deployment Plan Elements

The deployment plan elements shown on page 65 must be addressed whether a partial or full deployment approach is utilized. However, the elements are not all implemented at the same time. Some are critical at launch, others in the second phase of deployment (managing the effort), and others in the third phase (sustaining momentum and growing). At this point the launch elements need to be covered in detail, but the other elements can be defined at a high, strategic level. Details of these elements will be added at the appropriate time.

While seasoned planners may feel the need to define all deployment elements in detail from the very beginning, our experience is that trying to do so delays implementation, and can result in paralysis by analysis as you try to cross every "t" and dot every "i."

We will briefly describe each deployment plan element, and then go into detail on the critical launch phase items. We provide additional detail on the other elements in Chapters 5 and 6.

Strategy and Goals

Strategy and goals make up the first key element. This element is the responsibility of senior management, and sets the overall vision for Six Sigma deployment. A key element of the strategy is choosing the place where Six Sigma will start and what the rollout sequence and timing will be. Obviously, Six Sigma cannot be rolled out everywhere at once. A typical industrial rollout starts in manufacturing, and then when success is demonstrated, management initiates projects in the other areas of the business and new product development (DFSS—Design for Six Sigma).

Service businesses, such as insurance or consumer credit companies, would typically begin Six Sigma in operations. General business projects and DFSS typically begin six to eight months and one year after manufacturing, respectively.

There are two reasons for starting in manufacturing (operations in service companies)—both related to the fact that manufacturing tends to have the best measurement systems. First, it is much easier to achieve quick hits if you begin with a good measurement system, rather than having to take time to create one. Second, the existence of good measurements usually means that everyone is aware of the huge potential savings available in manufacturing, and anxious to go after them.

Conversely, many people will need to be convinced that huge savings are available in the finance department. Starting Six Sigma in manufacturing/operations sets the initiative up for success. Success in manufacturing/operations builds confidence that Six Sigma will work, as well as producing bottom line results that help "pay as you go," thereby enabling deployment throughout the organization.

Another decision is when to start Green Belt training—typically initiated eight to ten months after Black Belt training starts. Black Belts, dedicated to Six Sigma projects 100% of their time, are needed to get the initiative moving quickly. Some companies have a goal of training the entire professional staff as Green Belts (part time) as soon as it can be managed.

It is also important that one to two year goals for Six Sigma be developed and broadly communicated in the Executive workshop. The goals, which generally include financial targets, should be communicated for the organization as a whole and reinforced within each major part of the organization.

A goal not stated in financial terms is a clear indication that management is not serious about making Six Sigma successful. A financial goal tells the organization's members what is expected of them. For example, in the case of a $1 billion revenue company, a goal of $2 million to the bottom line from Six Sigma communicates a far different message than a goal of $10 million or $20 million. At $250,000 per project, $2 million translates into eight projects while $10 million and $20 million translate to 40 and 80 projects, respectively. Clearly, much more effort (people, time, and money) will be required to complete 40-80 projects than to complete eight. The financial goals will be revised over the course of several years of deployment.

Process Performance Measures

Process performance measures define what's important for success and are used to select projects. A pitfall to be avoided is selecting each

project independently. This is analogous to spending five minutes starting to clean 10 different rooms in a house, versus spending 50 minutes to completely clean one room. In the first case, it is difficult to see what impact the effort has had; in the second case there is a visible, tangible success that will now be ready to be leveraged elsewhere. It is preferable to launch Six Sigma by focusing on a few strategic areas, rather than 10 or 20. The process performance measures determined by senior leadership help everyone focus the initial projects strategically.

One model for key measures is quality, delivery, and cost (QDC). This model provides three strategic focus areas for the initial projects. Capacity is added when additional capacity is needed for the market or to run a more efficient operation (e.g., moving from a six- to seven-day operation to a five-day operation).

If all the projects affect one of these three areas, you will have significant tangible results when they are completed. Quality obviously relates to customer satisfaction, and an emphasis on it will almost always have the fringe benefit of saving money because you will reduce the costs of rejecting or reworking defective finished products, dealing with customer returns, shouldering warranty costs, and so on. The only exception is likely to be the case where delivering the desired quality level requires significant upgrade to equipment or materials. Surprisingly, this is rarely the case. See the discussion of process entitlement later in this chapter.

Delivery relates to the procurement, inventory, and logistics systems. Again, improvement here almost always enhances customer satisfaction, while reducing internal costs (excess inventory, loss of sales due to out-of-stock conditions, return of damaged or spoiled product, etc.) Reducing cost means reducing internal sources of waste or rework, regardless of whether this effort directly affects the customer. Improving the internal processes almost always results in better products and services, which ultimately benefits the customer.

In the case of service or transactional processes, the key process metrics are usually some form of accuracy or cycle time measures. Accuracy includes defects in information such as account numbers or financial figures, and directly relates to both customer satisfaction and rework costs. Cycle time of business processes is a productivity measure, so it also relates directly to costs and, of course, to customer sat-

isfaction (e.g., time to approve mortgage loan applications). Interestingly, in the vast majority of cases, attempts to define customer satisfaction or internal cost metrics result in some measure of accuracy or cycle time.

Project Selection Criteria

The process metrics are also used to develop a set of more specific criteria to select projects. The project selection criteria used by one company are summarized in the following list—

- Areas to improve
  - Waste reduction
  - Capacity improvement
  - Downtime reduction
  - Resource consumption (labor and raw materials)
- Effect on Customer Satisfaction
  - On-time delivery in full
  - Defect levels
- Effect on the bottom-line
  - >$250k per project
  - Doable in 4-6 months
  - Benefit realized in < 1 year

These criteria define areas that are important to improve and will produce significant bottom-line results. Note that the areas to improve are those that directly affect the customer satisfaction measurements. Project selection criteria also communicate what types of improvements are important to the organization. By communicating these criteria you alert the organization as to what your objectives are and the kinds of projects on which you want to focus. This increases the probability that large numbers of people in the organization will be involved in identifying opportunities for improvement. As noted, you will want to select projects strategically, rather than haphazardly.

Project Identification and Prioritization System

These project selection criteria are used in the Champion workshop to develop a set of initial candidate projects. The projects are put in the project hopper and prioritized for assignment to a Black Belt or Green Belt. Project selection will be discussed in greater detail later in this chapter. In later deployment phases organizations develop an ongoing system to identify potential projects, rank them, and place them in the project hopper, so that there is a continuously refreshed list of good projects.

Deployment Processes for Leaders

Lists of the Champions, Black Belts, MBBs, and Green Belts are also part of the deployment plan. In later deployment phases these lists will be expanded to become a system for selection, deployment, and advancement for each of these roles. The list of initial Champions will be developed at the Executive workshop. At the Champion workshop, the Champions will develop the list of initial projects, and based on this, develop a list of candidate Black Belts to lead these projects.

In Chapter 1 you learned that Six Sigma is about improvement—not training. It is strongly recommended that the projects be selected first and then the Black Belts for these projects. The Champions should be selected at the Executive workshop based on the areas targeted for improvement. Selecting the Champions and Black Belts before identifying specific projects increases the risk that important projects will be overlooked. This critical issue is discussed in-depth later in the chapter.

Roles of Management and Others

While there are generic job descriptions for Six Sigma titles, such as Champion, MBB, Black Belt, Green Belt, and so on, there is considerable variation in the actual role that these people play in different organizations.

Organizations should take the time to consider the specific roles that each of these will play in their deployment. Within reasonable boundaries, management can tailor the roles to a specific organization. The roles of the leadership team, Champions, MBBs, Black Belts, and functional groups should be defined in the Executive workshop and communicated to the organization. Discussion of guidelines for each of these roles is located later in this chapter.

Curricula and Training System

An overall training system for each of the Six Sigma roles is a key element of the deployment plan. At launch, a training schedule is needed only for the initial wave of Black Belts. As more and more people in various roles are involved in Six Sigma, new employees are hired, and the need is found for advanced training in certain areas (DFSS in engineering), a functioning training system with diverse curricula will need to be developed. A wave of mass training does not make a training system; mass training is an event that usually has no lasting impact. What is needed is a well thought out system that identifies all the training needs of all the roles, and puts together a sustained, ongoing system to continuously satisfy these needs in the most efficient way possible. This will be a tremendous amount of work, but fortunately the complete training system is not needed at the launch of Six Sigma.

Project and Six Sigma Initiative Review Schedule

A project review schedule is key for the deployment plan. Experience has shown that an effective schedule involves short (30-minute) weekly reviews by the Champion, and monthly reviews with the Plant Manager, functional leader, or SBU leader, as appropriate. These will be needed soon after the kick-off of the initial projects, and will be discussed in more detail in Chapter 5.

A review of the Six Sigma deployment should be done quarterly by the corporate or SBU leader as appropriate. All the elements of the deployment plan, and the associated goals, are appropriate agenda items for the quarterly reviews. This review is focused on how well the overall initiative is going; it does not focus on a review of individual projects. This review is critical to sustaining momentum of the Six Sigma effort long term, and is discussed in more detail in Chapter 6.

Project Reporting and Tracking System

This system documents the results of the projects, and provides valuable managerial information. Development of a formal system is not required in initial deployment, and is typically emphasized later in the deployment process, such as in the managing the effort phase discussed in Chapter 5. The project reporting and tracking system will keep a record of all the Six Sigma projects, providing a corporate memory of what has been

accomplished to date. The system will generate managerial reports at several levels to keep management informed of progress.

This includes financial results from the tracking system, as well as non-financial information, such as number of projects completed or in progress, time to completion of projects, status reports, and so on. The tracking part of this system is intended to document the financial benefits of closed projects. Obviously, this system needs to be designed with rigor so that the claimed financial benefits are accurate and credible. For small organizations, or to get started, a simple Excel™ spreadsheet will do the trick. Dedicated computer systems are eventually needed for larger organizations. More details on this system are given in Chapter 5.

Audit System for Previously Closed Projects

When your organization gets to the sustaining momentum and growing phase (Chapter 6) there will be a large number of completed projects, many of which will claim perpetual benefits; that is, benefits that will recur year after year. For example, if waste levels drop from 10 percent to 5 percent, and this improvement is maintained, cost savings from lower waste will be reaped every year. Unfortunately, in many improvement efforts these lower costs begin to creep up over time, much like weight lost on a diet. To some degree this is to be expected, since it is human nature to revert to old habits once the additional resources and focus brought by Six Sigma move on to other priorities.

Of course, you will need to preempt the natural digression back to old ways and rework levels if your efforts are to have lasting impact. Six Sigma has the advantage of a formal step in the DMAIC process, the control phase, which is specifically targeted to implement controls that prevent backsliding to the previous performance. As a second layer of protection, an audit system for previously closed projects needs to be implemented. This is not primarily a financial audit system to ensure that claimed benefits are real—financial controls need to be implemented from the very beginning. Rather, this audit system is intended to audit the control plan of previously closed projects and ensure that it is working. In other words, the audit system will check to make sure the benefits of this project are still being received. If not, action will be initiated to revisit the project, regain the benefits, and institute an effective control plan. This system is discussed at greater length in Chapter 6.

Reward and Recognition Plan

HR needs to develop a reward and recognition plan to ensure that the organization is able to obtain (and eventually promote) the best possible candidates for Six Sigma roles. We believe in the power of "intrinsic motivation" (the idea that people do something because they really want to do it), rather than solely relying on "extrinsic motivation" (people do something because they are coerced or "bribed" to do it). Therefore, those that have a fire in the belly for improvement will likely perform better in Six Sigma roles than those solely looking for money or promotion.

However, it must be recognized that a total lack of extrinsic rewards for involvement in Six Sigma is essentially a disincentive, therefore, consider rewarding these roles in such a way that top performers will be drawn to Six Sigma. This plan, which will be discussed in greater detail in Chapter 5, should be reviewed and revised as needed over time to ensure that the Champions, Black Belts, MBBs, Green Belts, and team members are properly recognized for their contributions. Most successful Six Sigma companies have revised their reward and recognition systems to more effectively support the Six Sigma initiative. A balance of both intrinsic and extrinsic motivation is encouraged.

Communication Plan

A communication plan has to be developed to support the Six Sigma initiative. This will be a very important part of the deployment plan because it will significantly affect the impression that rank and file employees have of Six Sigma.

Communication about Six Sigma typically utilizes existing media, but sometimes new media have to be developed. It is important to use a variety of media because people take in information and learn in different ways. There is variation in people as well as in processes. Some prefer personal contacts, either one-on-one or in groups. Others prefer to read newsletters or memos, while still others respond well to videos, webcasts, or emails. Leadership needs to carefully communicate why they chose to deploy Six Sigma, what they hope to get out of it, and where it will take the organization. One example of such a communication plan was the video that Jack Welch made (see Chapter 2), and which each exempt employee at GE was expected to watch. This was followed up with frequent emails to all employees with updates on progress of the initiative.

In some cases, such as GE and AlliedSignal, the CEO will make a bold statement about Six Sigma at the very beginning. However, we have also worked with organizations that did not feel comfortable making such bold statements. There is often a concern that if too big a deal is made of Six Sigma at the very beginning, unrealistic expectations will be set. Every employee might expect to begin Six Sigma training the next week. Customers may expect better products and services immediately. Confidence in the initiative may fade if people's unrealistic expectations are not fully met. Therefore, many organizations choose to begin the initiative in a fairly low-key manner, without hoopla.

Once actual projects are begun, and results are starting to flow in, the initiative will be more formally and broadly communicated. Leadership will be able to point to tangible savings that have already been accomplished, and can communicate the sequenced rollout of projects and training. The decision of when to begin implementing the communication plan needs to be made at the Executive workshop. The communication plan is discussed more fully in Chapter 5.

Experience and surveys have shown that every item on this list is important. Moreover all are needed for success; none are optional. Not paying attention to any of these items can seriously limit the effectiveness of the Six Sigma initiative. As previously noted, however, not all items need to be developed to the same degree of detail in the launch phase. The items that comprise the implementation process are the most critical initially.

Selecting the Right Projects

As noted earlier, the project selection process is started in the Executive workshop where areas for improvement are identified. Initial projects are selected in the Champion workshop based on the improvement areas identified by the executives, project selection criteria, and the project chartering process. This section discusses the characteristics of a good project and how to select one (see Snee [2001], Snee and Rodebaugh [2002]). Project selection is one of the key success factors for the launch phase.

What is a Six Sigma Project?

Six Sigma is about solving business problems by improving processes. Typical problems fall into two major categories: solution known,

and solution unknown. Six Sigma is aimed at solving the problem in which the solution is not known.

Such problems include decreasing errors in invoices, increasing the yield of a chemical process, decreasing the defect rate of an assembled project, and decreasing the days outstanding in accounts receivables. In 1989, J.M. Juran pointed out that "a project is a problem scheduled for solution." We define a Six Sigma project as a problem scheduled for solution that uses a set of metrics to set project goals and monitor progress.

The second category of problems frequently encountered is that in which the solution is known at the outset. Implementing a new computer network to conform to corporate guidelines, installing a new piece of equipment in manufacturing, or building a new plant are examples of known-solution projects. Most capital projects also fall into this category.

In each of these situations it is known what has to be done. The project is completed by assigning a project manager to the project, providing the needed resources, and using good project management techniques. Six Sigma techniques are usually not needed here, although project management can benefit from the process thinking, measurement, and monitoring techniques used by Six Sigma.

An organization's improvement plan typically includes projects of both types: solution known and solution unknown. Both types of projects are important and are needed to improve the performance of an organization. Solution-unknown projects are led by Black Belts or Green Belts. Solution-known projects are lead by project managers.

It is also essential that you carefully identify and document the process that contains the problem. The process provides the focus and context for the Six Sigma improvement work. Process identification is usually easy in manufacturing where you can simply follow the pipes, but it is much less obvious in finance or marketing. A Black Belt or Green Belt who utilizes the Six Sigma methodology then completes the project. Of course, there is no guarantee that every problem will be successfully solved, but with proper project and people selection we can expect a very high (80 to 90%) success rate.

To use Six Sigma, you also need one or more measurements that quantify the magnitude of the problem and can be used to set project goals and monitor progress. These measurements are usually called critical to quality (CTQ) measures. Six Sigma takes a disciplined, rigorous approach to problem identification, diagnosis, analysis, and solution. It is well suited for problems that do not have a known solution.

Selecting Good Six Sigma Projects

Now we turn our attention to selecting a Six Sigma project. The characteristics of a good Six Sigma project are—

- Clearly connected to business priorities
  - Linked to strategic and annual operating plans
- Problem is of major importance to the organization
  - Major improvement in process performance (e.g. >50%)
  - Major financial improvement (e.g. >$250K/yr)
- Reasonable scope—doable in 4-6 months
  - Support for project often decreases after 6 months
  - Project scope too large is a common problem
- Clear quantitative measures of success
  - Baseline, goals, and entitlement well-defined
- Importance is clear to the organization
  - People will support a project that they understand and see as important
- Project has the support and approval of management
  - Needed to get resources, remove barriers, and sustain over time

Projects should be clearly linked to business priorities, as reflected by the strategic and annual operating plans. It is also important to include projects addressing critical problems that must be solved in order for the organization to be successful in the next year.

A project should represent a breakthrough in terms of major improvements in both process performance (e.g., greater than 50%) and significant bottom-line results (e.g., greater than $250,000). The determination of project impact is the responsibility of the financial organization working in cooperation with the Black Belt and Champion.

This approach to measuring project impact sets Six Sigma apart from most other improvement approaches, because the financial impact is identified for each Six Sigma project by the finance department. Finance should know what the project is worth to the bottom line before work begins. This makes it an active participant in the improvement of the organization. This will be a new role for Finance in many organizations. Of course, Finance and other functions will still have their own projects, in order to improve their own processes.

The projects should be doable in four to six months. As pointed out by Bill Gates (1999), it is critical that projects be completed in this time frame in order to keep the organization and resources focused on the project. Organizations typically lose interest in projects that run longer than six months. Projects requiring more than six months of effort can usually be divided into subprojects of shorter duration, with the projects being conducted sequentially or in parallel. For this approach to work there needs to be strong project management to coordinate the set of projects.

There should also be clear quantitative measures of success, the importance of the project to the organization should be clear, and the project should have the full support and approval of management. These three characteristics are needed so that the organization sees the importance of the project, provides the needed support and resources, and removes barriers to the success of the project. People are more likely to support a project that they can see is clearly important to the organization.

Of course, these are generic attributes of a good project. Organizations still need to develop their own specific project selection criteria. Compare the generic attributes on page 78 to the more specific project selection criteria from one company listed on page 71.

The criteria on page 71 defined areas that were important to improve for this company, and projects based on these criteria did, in turn, produce significant bottom-line results. Note also that the areas to improve included customer satisfaction measurements. Project selection criteria communicate what types of improvements are important to the organization.

Project ideas can come from any source such as process assessments, customer and employee surveys and suggestions, benchmarking studies, extensions of existing projects, and so on. Many organizations struggle with how to find high-impact projects. Some sources that we recommend are:

- Rework and scrapping activities
- Overtime, warranty, and other obvious sources of waste
- Products with major backlogs—need for more capacity
- High volume products (small improvements can have huge impact)
- Problems needing solutions to meet annual operating plan
- Major problems with financial impact (customer or environmental crises)
- Large budget items, receivables, payables, treasury, taxes (follow the money)

Collectively these ideas are focused on major sources of waste, major problems (customer and environmental), major opportunities (capacity limitations in sold-out markets), and places where the money is going. Budget statements and cost of quality studies are also good sources for identifying opportunities (Conway [1992, 1994]).

Experience has also identified some characteristics of projects to avoid, or at least to further refine. Briefly stated, you should avoid, or redefine, projects that fall into any of these classifications:

- Fuzzy objectives
- Poor metrics
- No tie to financials
- Too broad a scope
- No connection to strategic or annual plans
- Solution already identified
- Too many objectives

For example, for the project to be successful the objectives need to be very clear. Such clarity is usually reflected in the process performance metrics and goals associated with the project. The process metrics should be clearly defined, and have baseline and entitlement values identified. In the case of non-manufacturing projects, the most useful process performance metrics are typically accuracy, cycle time, and cost. Cost is usually directly related to accuracy and cycle time metrics.

The project must be tied to the bottom line in some way. The project scope should be for improvements that are attainable in the four to six month time frame. An unrealistic scope (often referred to as a "boiling the ocean" project) is probably the most commonly encountered cause of project failure. Projects that are not connected to business priorities or that have too many objectives also need further refinement. Projects with an "identified solution" should be handled by a project manager instead of Six Sigma, or as mentioned earlier, be redefined to omit the specified solution in favor of allowing the Six Sigma methodology to identify the best solution.

The Concept of Process Entitlement

Entitlement is one of the most important concepts in process improvement, and is particularly useful in project selection. It is defined as the

best performance that you can reasonably expect to get from a process (Harry and Schroeder [2000]). As the term implies, leadership is essentially entitled to this level of performance based on the investments they have already made.

Knowing the process entitlement defines what's possible. If entitlement is 500 units per day and the baseline performance is 250 units/day, you can easily see that there is a lot of room for improving this process. On the other hand, if current baseline performance is 480 units/day there is little room for improvement. If higher production rates are needed, a search for a totally new process may be in order (i.e., reengineering or DFSS).

As an analogy, the concept of par for a golf hole is intended to represent the entitlement for a very good golfer. That is, for such a golfer par represents what score is possible and reasonable to expect. On one hole a golfer may score less than par, but it is unrealistic to expect such performance on every hole, or even on average. Of course, all golfers have their own unique capability, so the official par doesn't represent process entitlement for the average duffer. Proper analysis and/or calculations would reveal the appropriate individual entitlement, which for professionals would be better than par, and for most golfers much worse. Note that standard golfing handicaps are usually based on average performance, which is not the same concept as entitlement.

It is not uncommon to learn in situations where capital is being requested to increase capacity that baseline production is not near entitlement, once it is carefully calculated. Six Sigma projects are subsequently instituted to increase the capacity of the current process with solutions that don't require capital. Most companies deploying Six Sigma have been able to cancel existing capital expansion plans because of capacity that has been freed up through Six Sigma with no capital expenditures. For example, if a chemical plant with six production lines is running at a 25 percent waste level, reducing the waste levels to 10 percent (60 percent reduction) creates additional capacity of 6 x 15% = 90% of a production line, or essentially creates a new line with no capital expense.

Entitlement should be determined for all key process performance measures (yield, cost of poor quality, capacity, downtime, waste, etc.). It may be the performance predicted by engineering and scientific fundamentals, nameplate capacity provided by the equipment manufacturer, or simply the best, prolonged performance observed to date.

Entitlement can also be predicted from empirical relationships. In one instance it was observed that a process operating at a cost of \$0.36/unit had at one time operated at \$0.16/unit (correcting for inflation). This suggests that the process entitlement (as determined by best prolonged performance) should be \$0.16/unit. On further investigation it was observed that there was a linear relationship between defects and cost/unit of the form:

$$\text{Cost} = \$0.12 + 3(\text{defects})/1{,}000{,}000.$$

Therefore if defects could be reduced to very low levels (essentially zero) the true process entitlement may be as low as \$0.12/unit.

Entitlement is used in project selection as follows:

- Look at the gap between baseline performance (current state) and entitlement (desired state).
- Identify a project scope that will close the gap and can be completed in less than 4-6 months.
- Assess the bottom line impact of the project and compare it to other potential projects. A Black Belt or a Green Belt is assigned as priority dictates.

The gap between baseline and entitlement is rarely closed in the course of a single project. It is not uncommon for several projects to be required. In each instance the business case for the project is determined, the project is prioritized relative to the other potential projects, and a Black Belt or Green Belt is assigned as business priorities dictate.

Entitlement defines the performance level it is possible for a process to attain. It provides a vision of possible process performance, thereby providing a performance level for which to aim. It tells you how close current performance (baseline) is to the best possible performance. It also provides a benchmark that you can use to compare your process to other processes in your company or to processes in other companies. It is prudent to compute process entitlement values before doing any benchmarking studies to provide a basis of comparison.

Keep in mind that process entitlement can, and often does, change as you learn more about it. In most cases, the process entitlement calculations are simply estimates of the true entitlement, and you can update and

enhance them over time. After a few Six Sigma projects, it is not uncommon for a process to be performing beyond the entitlement level initially determined for the process. Changing the value of process entitlement as you better understand the process is a natural result of Six Sigma projects, and the need to do so should not come as a surprise.

Developing the Project Charter

The project charter has a critical impact on project success. This one-page document summarizes the key aspects of the project, in effect, defines what management wants done and what the Black Belt and Champion have agreed to accomplish. It forms a contract between all parties involved in the project.

Experience has shown that many continuous improvement projects fail because of misunderstandings among the team, the project leader, the customer, or management. For example, a team may proudly present a completed project that developed a web-based system for underwriting U.S. commercial credit lines for a leasing company. Management may have expected an internationalized version, however, and view the project as inadequate because it cannot be used in either Europe or Asia. A clear, concise, project charter avoids such misunderstandings and helps protect the project team from being second-guessed.

The charter is drafted by the Project Champion, refined by the Project Champion and Black Belt, and approved by the leadership team. It is not unusual for the charter to be revised a few times as the problem is better understood and data become available. Somewhere near the end of the measure phase the charter should define the scope of work that the project will accomplish. If such commitment is not made it will be hard for the project to satisfy expectations. It will be like trying to hit a moving target if the expectations, as defined by the charter, are constantly changing.

Figure 4-1 shows a template we have used for project charters that is similar to the template of Harry and Schroeder (2000). It is important that all the information required by the project charter be reported in the template. Blank entries are not acceptable. There are some potential problems for which you should be on the lookout.

Product or Service Impacted		Expected Project Savings($)	
BlackBelt/GreenBelt		Business Unit	
Champion		Start Date	
MBB		Target Completion Date	

Element	Description					
1. Process:	Process in which opportunity exists.					
2. Project Description:	Problem and goal statement (project s purpose)					
3. Objective:	Key process metrics impacted by the project	Process Metric	Baseline	**Goal**	Entitlement	Units
		Metric 1				
		Metric 2				
		Metric 3				
4. Business Case:	Expected financial improvement, or other justification					
5. Team members:	Names and roles of team members					
6. Project Scope:	Which are the dimensions of the project? What will be excluded?					
7. Benefit to External Customers:	Who are the final customers, what are their key measures, and what benefits will they see?					
8. Schedule:	Key completion dates.	**Project Start**				
	M- Measurement	**"M" Complete**				
	A- Analysis	**"A" Complete**				
	I- Improvement	**"I" Complete**				
	C- Control	**"C" Complete**				
	Other milestones					
		Project Complete				
9. Support Required:	Will any special capabilities, hardware, etc. be needed?					

FIGURE 4-1 Six Sigma Project Charter Template

It should be clear what process you are trying to improve (Charter Element 1). The process provides the focus and context for the work. A clear process definition helps the Black Belt see where the work will focus and what needs to be accomplished. Identifying the process is often difficult for those persons and organizations that are not skilled in thinking about their work as a series of interconnected processes.

The scope should be clear and attainable in less than a four to six month period (Charter Elements 2 and 6). Many projects fail because the scope is too big for the allotted time. Answering the question "Can we get this work done in less than four to six months (or whatever the required time frame)?" is a very effective way to test whether the project is properly scoped.

Keen attention should be paid to the process metrics (Charter Element 3). These measurements focus the Black Belt on the aspects of process performance that need to be improved, and the quantitative goals for the project. They are also used to calculate the financial impact of the project.

Leaving this section of the charter blank is not acceptable because the project will not be successful without the metrics, and should not proceed until data are available to properly define the project and allow you to calculate business impact.

The baseline, goal, and entitlement values for each of the key process metrics should be entered in the charter. You should include the metrics you want to improve as well as the metrics you don't want to negatively influence. For example, if the project is a capacity improvement project, and it is particularly important that product quality doesn't deteriorate, then both capacity and quality metrics should be addressed in the charter.

It is important that the business impact of the project is determined (Charter Element 4). This should identify both hard dollars (cost savings and profits from increased sales) that flow to the bottom line, as well as any soft dollar benefits such as cost avoidance. Many organizations deploying Six Sigma, including GE, only consider the hard benefits when publishing savings from the effort. Even when only hard benefits are reported, you should also document planned soft benefits in the charter. Leaving this section blank is unacceptable because without quantitative knowledge there will be no way of knowing what the project is worth and whether it is the right project on which to be working.

The project team should be small and not have more than four to six members (Charter Element 5). It is important that the team members

be identified by name in the charter to ensure that each is available to work on the project. The team can include specialists and technical experts as needed. All core team members should be available for at least 25% of their time. A common pitfall is having team members that are overloaded and not available to work on the project.

Another key item is the project schedule (Charter Element 8). As noted earlier the project should be scheduled for completion in less than 4-6 months. Some will try to resist such an aggressive schedule. Projects scheduled for competition in more than six months is another way a project can fail. The scope of projects taking longer than six months should be reduced, or serious consideration should be given to dividing the work into more than one project.

Once the project charter has been developed you are in a position to select the Black Belt and Champion who will be responsible for doing the project. The critical step of selecting the right people for your Six Sigma initiative is addressed in the next section.

Selecting the Right People

Finding the right people for the key Six Sigma roles is another ingredient for success in the launch phase, and is part of the implementation process. Leadership is the key characteristic to keep in mind when selecting the people who are to be involved in Six Sigma.

Achieving the desired results will require changing the way you work, and that means changing how you think about your work. Leaders are required in order to move everyone successfully from the old way of working to making Six Sigma an integral part of your new way of working. Everyone involved in Six Sigma is a leader (Champions, MBBs, Black Belts, Green Belts). To be successful select your top talent—your best performers—those persons that are capable of providing the needed leadership. Deploying Six Sigma is not an easy task; breakthrough improvement is the goal. For the longer-term you will want Six Sigma to be the driver of your improvement process. You want your senior managers to be skilled in using Six Sigma to help run your business. It is a serious mistake to place only technical specialists (engineers, statisticians, quality professionals, and so on) in key Six Sigma roles. Such major culture change requires persons experienced and skilled in leadership.

The need for leadership is evident in the roles of corporate and unit leadership, Project Champion, Black Belt, and MBB, summarized in Table 4-2.

TABLE 4-2 Six Sigma Roles

Corporate Leadership	Unit Leadership	Project Champions	Black Belts	Master Black Belts	Functional Support Groups
Create and deploy strategy and goals	Establish project selection criteria	Facilitate project selection	Learn and use the Six Sigma methodology and tools	Develop and deliver Six Sigma training	Provide data and aid in data collection
Define boundaries—what's in and what's out	Approve projects—ensure linkage to strategy and key needs	Create project charter	Develop and maintain project work plan	Assist in the selection of projects	Provide team members
Communicate purpose and progress	Select Project Champions	Facilitate identification of resources—BB, team, $$, functional resources	Provide leadership for the team	Coach and council Black Belts	Support with expertise in the department such as financial value of projects
Provide resources—people, time, and $$	Provide needed resources and training	Remove barriers	Meet weekly with the Project Champion	Ensure the success of "mission critical" projects	Identify opportunities for Six Sigma projects
Ensure training plan is in place	Review Black Belt and Green Belt projects monthly	Review projects weekly	Communicate support needs to functional groups	Support the efforts of Champions and leadership team	Help with benchmarking
Ensure recognition plan is in place	Establish and use communication process	Verify project deliverables for each phase of DMAIC	Ensure that the right data are collected and properly analyzed		Set boundaries (legal, company policy, environmental)
Quarterly review of overall initiative	Review the entire process every 3-6 months	Communicate purpose and progress of projects	Identify and communicate barriers to Champion		Provide reality check, diversity of ideas, perspective
Periodic reviews of plant and business initiatives	Establish reward and recognition structure	Approve project closure	Provide monthly updates to Champion and Master Black Belt		

(continued on next page)

TABLE 4-2 Six Sigma Roles *(continued)*

Corporate Leadership	Unit Leadership	Project Champions	Black Belts	Master Black Belts	Functional Support Groups
Support initiative with rewards and recognition	Link rewards to performance	Identify next project for the BB/GB	Be responsible for delivering results ($$)		
Publicly celebrate successes	Be accountable for the success of the effort	Celebrate, recognize, and reward BB and team			
		Be accountable for project results			

The role of the leadership team depends on the size of the company. In large companies there should be a leadership team at the corporate level as well as a leadership team for each of the business units and functions. The key elements of the corporate leadership role are:

- Providing strategy and direction
- Communicating purpose and progress
- Enabling and providing resources
- Conducting reviews
- Recognizing and reinforcing

Leadership Team

The role of the unit leadership team is also summarized in Table 4-2. We define the unit as the entity responsible for identifying the improvement opportunities and chartering the Six Sigma projects. This could be a division, a facility, or a function. The unit leadership team (often called the Six Sigma Council) leads the overall effort within the unit. In the case of a manufacturing facility, the leadership team is typically the Plant Manager and selected members of his or her staff. In the case of the finance function the leadership team might be the CFO and selected members of his or her staff. A key dif-

ference between the roles of the two leadership teams is that the unit-level team has responsibility for the projects.

Champion

Each project has a Champion who serves as its business and political leader. Some organizations have used the term Champion to refer to the overall leader of the Six Sigma effort. The Project Champion is typically a member of the unit leadership team, has responsibility for the successful completion of projects, and is held accountable for the results of the projects. Key tasks for the Champion role are: facilitating the selection of the project; drafting the initial project charter; selecting the Black Belt and other resources; removing barriers to the successful completion of the project; and holding short weekly reviews with the Black Belt regarding the progress of the project.

The Champion has direct contact with and provides guidance and direction for the Black Belt. In some cases the Black Belt may be a direct re-

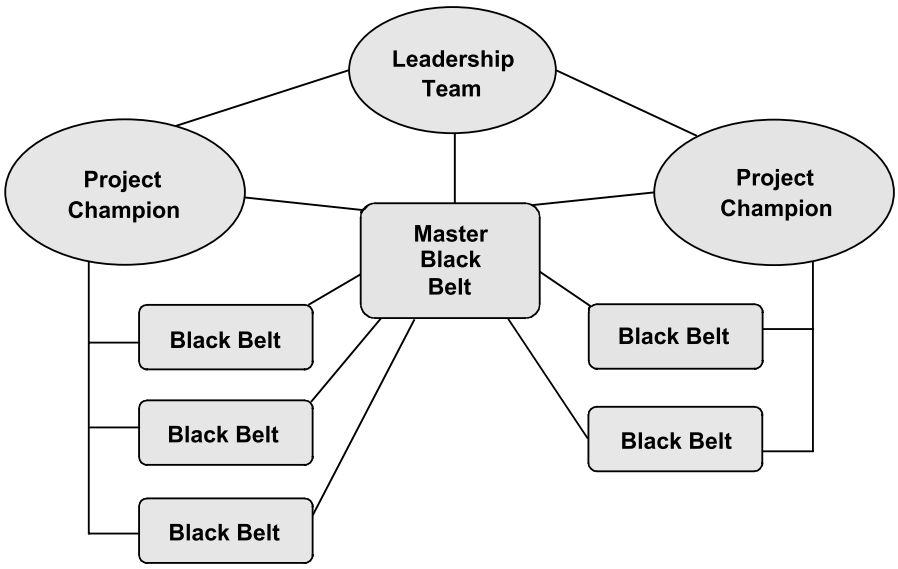

FIGURE 4-2 Organization of Multiple Project Champions and Black Belts

port of the Project Champion. In other situations the Black Belt may also report to a MBB. As shown in Figure 4-2, a unit typically has more than one Project Champion, with each directing one to three Black Belts. The Project Champion role is usually part time but can be a full-time responsibility in some organizations. In most cases the part-time role works best because it involves more managers in the Six Sigma improvement process.

Black Belt

The Black Belt leads the team that works on the project. A Black Belt should be—

- A technical leader in the area of the project
  - Helpful for the first project
  - Less important for subsequent projects
- Respected by the organization
- Computer literate
- An analytical thinker—not afraid of numbers
- Skilled in basic statistics
- A team leader—soft skills
- Skilled in project management
- A positive thinker—can-do attitude

These characteristics are clearly those of a leader and the people who possess them are the kinds you will want to lead your organizations in the future. In his latest book, *Jack, Straight from the Gut* (Welch [2001]), Jack Welch predicts that the person to follow Jeffrey Immelt as CEO of GE will be a former Black Belt.

Black Belts get things done. They are hands-on workers, work full time on their projects, and do much of the detailed work. They should be selected on the basis of what they can do, not on the basis of what they know (Hoerl [2001]). Black Belts also act as mentors for Green Belts, as do MBBs.

Green Belt

Green Belts may lead their own project under the direction of a Champion or MBB, or they may work on a portion of a Black Belt project under the direction of the Black Belt. Green Belts work part-time, devoting typically 25 percent of their time to the project. Green Belt projects are typically less strategic and more locally focused than are Black Belt projects. A Green Belt project is typically worth $50,000 to $75,000 per year to the bottom line and should be completed in less than four to six months. Since Green Belts work on improvement projects in addition to their existing job responsibilities, several companies (such as GE) have as an objective that eventually all professionals will be at least Green Belts. Some Green Belts will become Black Belts, so it is advisable for some of the Green Belts to have many of the Black Belt characteristics.

Master Black Belt

The MBB is the technical leader who enables the organization to integrate Six Sigma within its operations. The MBB should have strong leadership and technical skills and be politically savvy with a good understanding of the business, since he or she will work closely with Champions and the leadership team.

The MBB has typically completed several Black Belt projects and two to five weeks of training beyond the four weeks of Black Belt training. He or she helps the Champions select projects and reviews their progress. The MBB provides training and mentoring for Black Belts, and in some instances training for Green Belts. Like the Black Belts, the MBBs should be full-time.

MBBs play other roles as well. They should help lead mission-critical projects as needed. This work not only contributes to the success of the organization, but also enables the MBB to further develop process improvement skills. MBBs should also be responsible for ensuring that baseline and entitlement data are available and up-to-date for all key processes—important to effective project selection. MBBs are in an excellent position to identify and distribute best practices for process improvement and management and to distribute them around the organization. Many organizations develop a MBB network that meets periodically to share these best practices around the company.

In essence, MBBs are intended to combine technical skills beyond those of the Black Belt with managerial and leadership skills similar to those of a Champion. Most companies hire Six Sigma providers to deliver the initial Six Sigma training. It is the role of the MBB to gradually take over the responsibility for this training. Experience has shown that Six Sigma is internalized most quickly in those companies that develop their cadre of MBBs most rapidly.

Functional Support Groups

The functional support groups, such as HR, Finance, IT, Legal, Engineering, Quality Assurance, and so on assist the Six Sigma effort in four key ways. They:

- Provide data as needed by the Black Belt
- Provide expertise
- Provide members for the Black Belt project team
- Help identify improvement opportunities

The functional groups are typically involved in more aspects of the organization's work than are other groups and, as a result, they see where improvements are needed in cross-functional processes. For example, the finance organization interacts with Procurement, Manufacturing, Marketing, Logistics, Sales, and R&D, and therefore can more easily pinpoint cross-functional issues that need to be addressed.

Many companies overlook the role of the functional support groups and as a result slow the progress of the Six Sigma initiative. Sometimes Black Belts can't get the expertise and team members when they need them; worse yet, poor planning results in no resources to implement improvements. Careful planning and attention to the availability of functional resources as early as possible are time and effort well spent

Forming Teams

A key question is "How do I form the team that will work with the Black Belt or Green Belt?" The short answer is appoint no more than six people who are familiar with the process and will be involved with implementing the Six Sigma solution.

The team should not have more than 4-6 persons. Larger teams are generally ineffective because they have trouble finding a meeting time when all can attend. Large teams also often have trouble reaching consensus, and responsibility may be diluted. If it seems that the task is too great to be done by four to six people, the project is probably too large, and should be split into two or more smaller projects. These smaller projects can still be coordinated at periodic coordination meetings between the Project Champions.

The team needs to include people who are familiar with the process, can contribute to identifying the solution, and will be involved in its implementation. Experts and consultants, even internal or external customers and suppliers, can also be ad hoc members of the team, participating when needed. The core members of the team should be available 25% of the time to work on the project. The team receives any needed training delivered just in time by the Black Belt or MBB as appropriate.

The best approach to forming the team is for the Black Belt to create it in consultation with the Project Champion and the managers to whom the prospective team members report. The process might look like the following:

1. Black Belt and Champion discuss potential team members.
2. Black Belt or Champion gets the approval of the team members' management for them to be on the team.
3. Champion addresses any barriers identified, getting higher management involved as needed.
4. Black Belt and the team work on the project.

As in any partnership, the Black Belt and Champion work out who will do what in the team-forming process. A MBB may become involved if needed. It is important that both the Black Belt and Champion build support for the project with all the involved stakeholders. People are more likely to support a project when the purpose and value is understood, their role in the project is clear, and they see how they will benefit from the successful completion of the project. The Project Champion has the responsibility to see that any problems or barriers identified are resolved.

Where Do I Find the Resources?

This is the question most commonly asked when managers first hear about Six Sigma and every Six Sigma leader should have a ready an-

swer. Help can come from reevaluating employees' responsibilities and from hiring from outside.

Some companies, to increase their capabilities and to move up the learning curve more quickly, may hire a MBB or a Vice President of Six Sigma to lead the implementation effort. Some will hire experienced Black Belts from other companies to lead projects, or new employees to backfill for Black Belts and MBBs.

Far and away the most popular resource strategy for companies deploying Six Sigma is to reevaluate existing work programs, and to reprioritize how they utilize their resources. As a result, Six Sigma is deployed using existing resources. This strategy is used most often, but is not initially the favorite of managers who must rethink priorities and deal with personnel changes. Fortunately, this stress decreases as managers learn to deploy Six Sigma and see it improve the performance of their organization.

Over time managers find many different ways to backfill for the employees that have become Black Belts or MBBs. Some projects will already be in the Black Belt's assigned area of responsibility, so even without Six Sigma they would likely have worked on this problem. If necessary, the Black Belt's previous responsibilities can be assigned to other employees and contractors; some work can be postponed; some work is non-value-added and can be eliminated. Resource sharing, while hard for some to do, is an effective way to create resources.

In short, look for two things—underutilized capacity and unrecognized capability. Some employees are not working to their full potential. Some employees can handle bigger workloads. Some are doing tactical work that could be better done by others, freeing these employees to do more strategic work, including Six Sigma. Many times engineers are seen creating budgets, writing talks for others, or doing paperwork rather than improving processes. We met one overworked and highly stressed vice president of sales who was reviewing *every* sales contract obtained by the company. Clearly a lot of time could be freed by delegating the review of smaller contracts to subordinates.

What Training Do I Need?

Six Sigma requires people to think and work in different ways. This requires that they be trained in the new way of thinking and working. There is a lot of training to be done as spelled out in the implementation plan. The key

groups to be trained are executives, business teams, site leadership teams, functional leadership teams, Champions, MBBs, Black Belts, and Green Belts.

The Executive, Business Team, Site Leadership Team, and Functional Leadership Team workshops are typically one or two days and focus on what Six Sigma is, how it will be deployed, and roles of the groups involved. These are active workshops in which work is done on the deployment and implementation plans; not passive overviews. A draft deployment plan with carefully selected areas for initial projects is a key output of these workshops (Figure 4-3).

The Champion workshop is typically three to five days. Its focus is on developing a deeper understanding of Six Sigma, deployment in the organization, and roles of the Project Champion and the Black Belt. Project Champions are trained to guide the work of the Black Belts. The Champion also spends time learning the DMAIC process and understanding the Six Sigma tools the Black Belt will be using.

Black Belt training typically lasts four weeks, with each week focused on a phase of the DMAIC process. The usual sequence is Week 1 (define and measure), Week 2 (analyze), Week 3 (improve), and Week 4 (control). The recommended outlines for finance and manufacturing-oriented courses proposed by Hoerl (2001) are shown in the following two lists. Note that these outlines include both Design for Six Sigma (DFSS) methodology and tools. Some companies teach DFSS separately, while others prefer to integrate it with DMAIC training. Both approaches work.

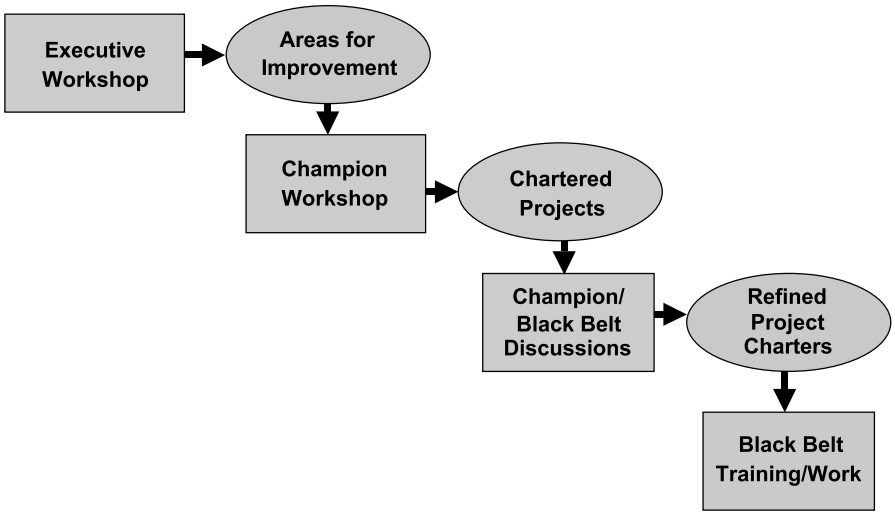

FIGURE 4-3 Project Development Through Workshops

Sample Black Belt Course for Finance

(This course is in three weeks, with Week 3 being a Black Belt addition to an existing Green Belt course)

Week 1

- The DMAIC and DFSS (Design for Six Sigma) improvement strategies
- Project selection and scoping (Define)
- QFD
- Sampling principles (quality and quantity)
- Measurement system analysis (also called "gage R&R")
- Process capability
- Basic graphs
- Hypothesis testing
- Regression

Week 2

- DOE (focus on 2-level factorials)
- Design for Six Sigma tools
- Requirements flowdown
- Capability flowup (prediction)
- Piloting
- Simulation
- FMEA
- Developing control plans
- Control charts

Week 3

- Power (impact of sample size)
- Impact of process instability on capability analysis
- Confidence Intervals (vs. hypothesis tests)
- Implications of the Central Limit Theorem
- Transformations
- How to detect "Lying With Statistics"
- General Linear Models
- Fractional Factorial DOEs

Sample Black Belt Course for Manufacturing

(The superscripts refer to the week in which the material would appear)

Context[1]

- Why Six Sigma
- DMAIC & DFSS processes (sequential case studies)
- Project management fundamentals
- Team effectiveness fundamentals

Define[1]

- Project selection
- Scoping projects
- Developing a project plan
- Multi-generational projects
- Process identification (SIPOC)

Measure[1]

- QFD
  - Identifying customer needs
  - Developing measurable critical-to-quality metrics (CTQ's)
- Sampling (data quantity and data quality)
- Measurement System Analysis (not just gauge R&R)
- SPC Part I
  - The concept of statistical control (process stability)
  - The implications of instability on capability measures
- Capability analysis

Analyze[2]

- Basic graphical improvement tools ("Magnificent 7")
- Management and planning tools (affinity, ID, etc.)
- Confidence intervals (emphasized)
- Hypothesis testing (de-emphasized)
- ANOVA (de-emphasized)
- Regression
- Multi-Vari Studies
- Developing conceptual designs in DFSS

Improve[3-4]

- DOE (focus on two level factorials, screening designs, and RSM)
- Piloting (of DMAIC improvements)
- FMEA
- Mistake-proofing
- DFSS design tools
  - CTQ flowdown
  - Capability flowup
  - Simulation

Control[4]

- Developing control plans
- SPC Part II
  - Using control charts
- Piloting new designs in DFSS

Green Belt training typically lasts two weeks with Week 1 focused on the define, measure, and analyze phases of DMAIC and the second week focused on the analyze and control phases. A recommended outline of topics for manufacturing Green Belt training is shown here—

Context[1]

- Why Six Sigma
- DMAIC (sequantial case studies)
- Project management fundamentals
- Team effectiveness fundamentals

Define[1]

- Project selection
- Scoping projects
- Developing a project plan
- Process identification (SIPOC)

Measure[1]

- QFD
  - Identifying customer needs
  - Developing measureable critical-to-quality (CTQs)
- Sampling (data quantity and data quality)
- Measurement System Analysis (not just gage R&R)
- SPC Part I
  - The concept of statistical control (process stability)
  - The implications of instability on capability measures
- Capability analysis

Analyze[1, 2]

- FMEA
- Basic graphical improvement tools ("Magnificent 7")
- Confidence intervals (emphasized)
- Hypothesis testing (de-emphasized)
- ANOVA (de-emphasized)
- Regression
- Multi-Vari Studies

Improve[2]

- DOE (focus on two level factorials)
- Piloting (of DMAIC improvements)
- Mistake-proofing

Control[2]

- Developing control plans
- SPC Part II
  - Using control charts

Black Belt and Green Belt training topics and areas of emphasis must be based on the specific needs and targeted applications of the organization. The sample curricula presented here form a base of reference or

starting point, not the final answer for all organizations. Alternative curricula, as well as guidelines for conducting effective training, can be found in Hoerl (2001) and its associated discussion.

Key to the success of Black Belt and Green Belt training is the practice of working on real projects during the training. It is our firm belief that a real, significant project should be the admission ticket for the training: "No Project, No Training." As noted earlier, if the projects are completed, the resulting benefits should more than pay for the training.

Organizing and conducting Six Sigma training needs careful planning, coordination, and execution. It is so important for the training leaders to have experience in the deployment of similar efforts that most companies hire outside Six Sigma consultants to provide this service initially. Experienced providers have the knowledge, experience, capability, and capacity to do what is needed to create a successful deployment. Once the initiative has been successfully launched, and internal MBBs obtain sufficient experience, they should begin to assume leadership of this effort.

Selecting a Six Sigma Provider

Now that you have learned what is required to properly launch Six Sigma, you are in a position to decide whether to hire a Six Sigma provider (consulting firm) to help with the training and initial deployment of Six Sigma. Almost all companies get external help of some kind, which makes good business sense. Hiring a Six Sigma provider enables a company to learn from those who have gone before and move up the learning curve more quickly. The consultant costs should be much more than covered by the returns of the higher number of projects that can be completed using the expertise of a seasoned consultant. Black Belt projects can also produce bottom line results before the training is completed, as quick fixes are often found in the measure and analyze phases of the DMAIC process. It is not unusual for 30-50% of the projects to produce bottom line savings before the training is complete, and for these benefits to more than cover the training costs.

This point is so important it is worth repeating: employing an outside Six Sigma provider is cost effective and can help an organization move up the learning curve more quickly.

Using an outside provider is also a high-yield strategy because executives and managers will listen to those from the outside more readily

than to the company's employees. It is difficult to be a prophet in your own land, even when the knowledge to do the work exists within the organization. Specific advice on how to choose a Six Sigma provider is presented with the questions and answers after Chapter 8.

Summary

The launch phase of Six Sigma is roughly the period between making the decision to deploy Six Sigma, and completing the initial wave of Black Belt training. This typically lasts 6-9 months. The purpose of this phase is to ensure that you "hit the ground running" in Six Sigma deployment. The key deliverables are:

- An overall deployment plan (strategy)
- The initial wave of projects
- Trained Black Belts, and other key roles, in place

As noted in Chapter 3, committed leadership is the key success factor in this phase. It will take committed leadership to make time to actively participate in leadership workshops, persevere through completion of the deployment and implementation plans, allocate the human resources and funding required for the effort, and address any resistance from within the organization. Leaders will need to provide clear vision and direction. Other important success factors are:

- Selection of good initial projects
- Selection of people for key roles
- Full-time allocation of Black Belts and MBBs
- Effective, tailored training for key roles
- Support from functional groups as needed

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