Chapter 1

The Meaning of Six Sigma

Many years ago at Fisherman's Wharf in San Francisco, I saw a fisherman sewing up holes in his net. The net was quite large and he had lain it out over a wide expanse of the dock. I watched him for quite some time, noticing that he paid careful attention to even the smallest tear, methodically repairing each one in turn. When he took a break I walked over to him. "Why do you have to fix all the tears, even the little ones?" I asked him. He explained, "It only takes one small tear for all of the fish to escape."

Perfection—impossible to achieve completely and all of the time—is a goal worth keeping in mind. If we set our sights any lower, we deserve what we get. If we settle for 80 percent or 70 percent, we can never expect to reach 95 percent or 98 percent. As the old fisherman explained, even the smallest imperfection affects the entire effort. A small tear in the net becomes a bigger tear and the fish escape as the net is pulled in. The corporate world works in the same way. What might seem a minor imperfection or a flaw in a remote department affects you and your product or service. The solution: We have to find all the tears and repair them, methodically and completely. Yes, new tears will appear in the net, but we cannot shrug and explain, "We found most of them." We also cannot just shrug and say, "It's not my job." Perfection is not a requirement, but it is a goal worth setting. We can

then compare our outcomes to the goal, seeing improvement and measuring it against that goal.

sigma
the level of variation compared to an average; the Greek letter, σ used by statisticians to denote standard deviation.

THE ORIGINS OF SIX SIGMA

Sigma is the letter in the Greek alphabet used to denote standard deviation, a statistical measurement of variation, the exceptions to expected outcomes. *Standard deviation* can be thought of as a comparison between expected results or outcomes in a group of operations, versus those that fail.

The measurement of standard deviation shows us that rates of defects, or exceptions, are measurable. *Six Sigma* is the definition of outcomes as close as possible to perfection. With six standard deviations, we arrive at 3.4 defects per million opportunities, or 99.9997 percent. This would mean that at Six Sigma, an airline would lose only three pieces of luggage for every one million that it handles; or that the phone company would have only three unhappy customers out of every one million who use the phone that day. The *purpose* in evaluating defects is not to eliminate them entirely, but to strive for improvement to the highest possible level that we can achieve.

standard deviation
the degree of exception, or variation from the average, in a group of outcomes, used to describe exceptions to an expected result.

Key Point We evaluate defects to improve overall performance, knowing that eliminating them completely is unrealistic.

Six Sigma
a measurement denoting near perfection, representing six standard deviations or 3.4 million defects per million operations; the ideal against which actual performance is measured.

We know that trying to achieve Six Sigma would be impractical on a consistent basis; so while it is a desirable goal, it presents a model against which we can measure our performance. So rather than setting the unrealistic goal of achieving perfection, we can observe (1) our current Sigma level and (2) improvement in that level as changes are made.

Table 1.1 presents an abbreviated summary of Sigma level, defects per million, and yield, or success rate of the outcomes.

You can identify your level of Sigma performance and then compare it to the chart. This is where the bene-

TABLE 1.1 Sigma Table

Sigma	*Defects per Million*	*Yield*
6.0	3.4	99.9997%
5.0	233.0	99.977
4.0	6,210.0	99.379
3.0	66,807.0	93.32
2.5	158,655.0	84.1
2.0	308,538.0	69.1
1.5	500,000.0	50.0
1.4	539,828.0	46.0
1.3	579,260.0	42.1
1.2	617,911.0	38.2
1.1	655,422.0	34.5
1.0	691,462.0	30.9
0.5	841,345.0	15.9
0.0	933,193.0	6.7

fits of Six Sigma are realized. By comparing your outcomes to the ideal outcome of Six Sigma, you can quantify quality itself.

Example: Your department performed 535 specific operations last month. Of these, 43 were defective (they fell outside the acceptable range of outcomes). This means that 492 of the operations were successful. The yield was:

492 ÷ 535 = 91.9%

Referring to Table 1.1, we discover that this outcome represents Sigma somewhere between 2.5 and 3. If you were able to reduce the number of defects by half, ending up with 21, your acceptable outcomes would then grow to 514 out of 535 operations, and your yield would increase as well:

514 ÷ 535 = 96.1%

Now the Sigma is between 3 and 4, a significant improvement. Of course, if you cut defects in half, you are going to know your outcomes have improved, so what purpose does Six Sigma provide beyond the obvious scorekeeping? As the preceding example demonstrates, improvement in quality can be specifically measured. In practice, you may be dealing with a much greater volume of outcomes, and the incremental rate of success is likely to be smaller than that shown in the example; and Six Sigma is far more than a measuring system. It is a way of doing things, a change in cultural attitude that is designed to create a company-wide team in practical terms. As far as the scorekeeping aspects of Six Sigma go, if you begin with an assumption that a change in procedures will produce an expected change in outcomes, you can then compare actual to projected results to judge the success of your work.

Key Point What makes Six Sigma different from most other quality control programs? It is more than just a way to improve performance; it is a method for changing the corporate culture, from top to bottom.

An "operation" can be any function you perform—delivery of goods, telephone contact, balancing accounts, or executing a repair, for example. Any operation is measurable in Sigma terms. The desired outcome represents satisfaction of the customer's expectation, and any time that expectation is not met, the outcome is defective.

While measuring results is a crucial part of the process, you will be more concerned with how Six Sigma is applied and what role you and other employees will perform within that process. So the idea of Six Sigma is much more than the latest approach to quality control; it represents a change in philosophy that affects everyone. It is designed to bring everyone into a single team with the same overall goals. So many corporate employees—especially in large organizations—have a sense of isolation or view their relatively small department as a realm unto itself. Six Sigma encompasses the entire corpora-

tion as a single team and is aimed at removing that sense of isolation.

The concept of Six Sigma began at Motorola in the 1980s. An engineer named Mikel Harry began analyzing variation in outcomes in the company's internal procedures, and realized that by measuring variation it would be possible to improve working systems. However, whereas other quality systems were designed at only measuring performance, the Six Sigma approach that grew from Harry's original ideas was different. The procedures were aimed at taking action to change procedures so that overall performance could be improved permanently—and at every level within the company.

Within a few years, the same idea had taken root at General Electric and AlliedSignal. GE decided in 1995 to implement Six Sigma throughout the entire organization. CEO Jack Welch led the company through this implementation, and many divisions of GE experienced impressive improvements in quality during those years. Estimates are that cost savings from Six Sigma application exceeded $320 million within the first two years, and more than $1 billion by 1999.[1]

Key Point Cost savings are an important aspect of quality control, but they are only *one* aspect; a permanent, effective, and rewarding quality program requires more work.

So many quality programs have been devised, named, and put into effect over many years. Most fail after a while because employees lose faith in those programs. It becomes obvious to employees that "quality control" really represents management's attempt to cut costs and expenses and get more work from its labor force. In other words, the program applies to the worker but there is no change in management itself. If the final result of a quality program is to achieve increased efficiency, and that results in layoffs, who benefits? With Six Sigma, everyone is involved and everyone is expected to change (for the better) as part of one overall team. The purpose is not assigned to the rank and file, but is shared from top to bottom.

BUSINESS PROCESS MANAGEMENT (BPM) AS A STARTING POINT

Like all other specialized processes, Six Sigma involves the use of a series of specialized terms. They have specific meaning and are important in distinguishing the roles that people play in executing the successful Six Sigma procedure.

The concept of Six Sigma begins with a process model and its implementation is called *Business Process Management (BPM)*. Using the BPM model allows us to understand how work evolves and to move *through* the organization from input to output.

BPM (Business Process Management) an approach to work based on a model (Business Process Model) describing how work moves from step to step through the organization.

To visualize how BPM helps us to (1) design, (2) communicate, and (3) improve systems, we use a flowchart. Those who grew up in the computer age are accustomed to seeing flowcharts that move from top to bottom. We have come to think of work flow in similar terms; but in practice, we can better express the workings of a procedure when we express work flow from left to right. This is not merely the mincing of words or the moving of a vertical flowchart to a horizontal one. In fact, the horizontal BMP model is a powerful tool for identifying likely problem areas within processes and then for taking steps to decrease defects.

The design of the basic model horizontal flowchart is shown in Figure 1.1.

Note that there appear to be three horizontal levels in the process area of this illustration. These represent de-

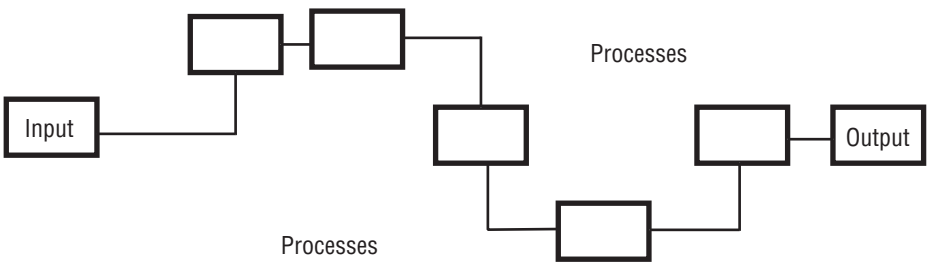


FIGURE 1.1 Model horizontal flowchart.

partments, individuals, or other sub-teams that perform specific functions. Because the exact mix of responsibility is likely to vary from one process to another, these may be described as areas of responsibility.

A timeline can be added along the bottom, if desired, to indicate how timing comes into play in the process. Additionally, any reports or other generated work documents can be identified with drop-down boxes. This ties the interim output to the area of responsibility, point in the process, and timing of the task.

Key Point The horizontal flowchart is not just a passive work flow summary; it is a working document used for identifying the steps in a process and, most significantly, for highlighting the likely places where variances, or defects, are most likely to occur.

In determining how to best improve quality, we have to first ensure that work flow is logical and complete. The horizontal flowchart used for BPM enables us to examine each step along the way to make sure we understand time requirements, steps and sequence, and specific responsibility. These include determining what has to be received in order to execute a step, and what has to be passed on for the next step. This is a methodical and precise method, both for defining work flow and finding likely variables—where defects or failures are likely to occur. Figure 1.2 highlights these points in the process.

In the figure, we have identified exact steps in the process where we believe variances are most likely to occur, or where defects are likely to be generated. These points are identified as black rectangles. The assumption in a process involving multiple areas of responsibility is that the likely variance points are strongest when processes move from one area to another. As long as a process is confined to a single area of responsibility, its steps can be managed by a limited number of supervisors or managers. When more than one area of responsibility comes into play, we can place emphasis on the points where a step is completed and the process then moves elsewhere. This is where problems are most likely to arise.

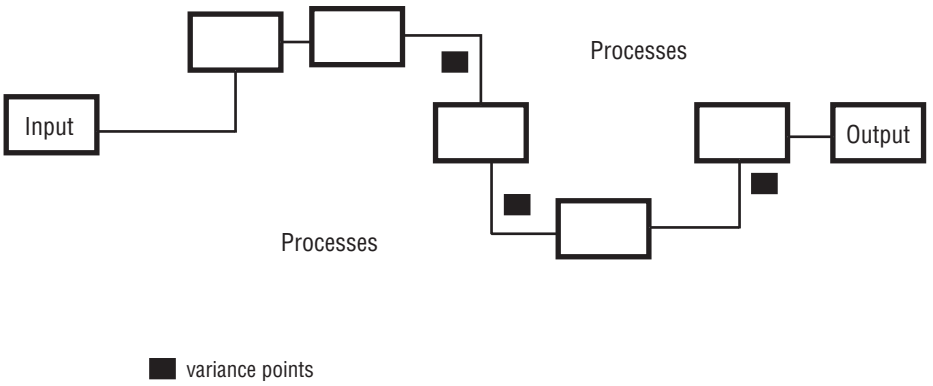


FIGURE 1.2 Model horizontal flowchart with variance points.

These include a failure to act in a timely manner, processing with incomplete data, interpretations containing errors, and similar, common variances.

We further expand the horizontal flowchart to identify both a timeline and interim documents generated throughout the process. This is shown in Figure 1.3.

In this expanded version of the horizontal flowchart, we have a complete picture: Areas of responsibility, process flow from one step to another (including changes between areas of responsibility), likely variance and defect points, a timeline, and interim and final reports.

Understanding the essential importance of BPM is a starting point in Six Sigma. For example, if you have a process riddled with defects, the best way to identify the problem—as a starting point—is to prepare the horizontal flowchart. By methodically speaking with each person, department, or team involved in the process, we can put together a complete picture of how it works and how it *should* work. This highlights variance points leading to identification of likely defect points so that appropriate changes can be made. This is how the Sigma level is effectively raised—by focusing on variance points and enforcing procedures where those occur.

The flowchart approach to defining processes can be used effectively for improving existing procedures, mak-

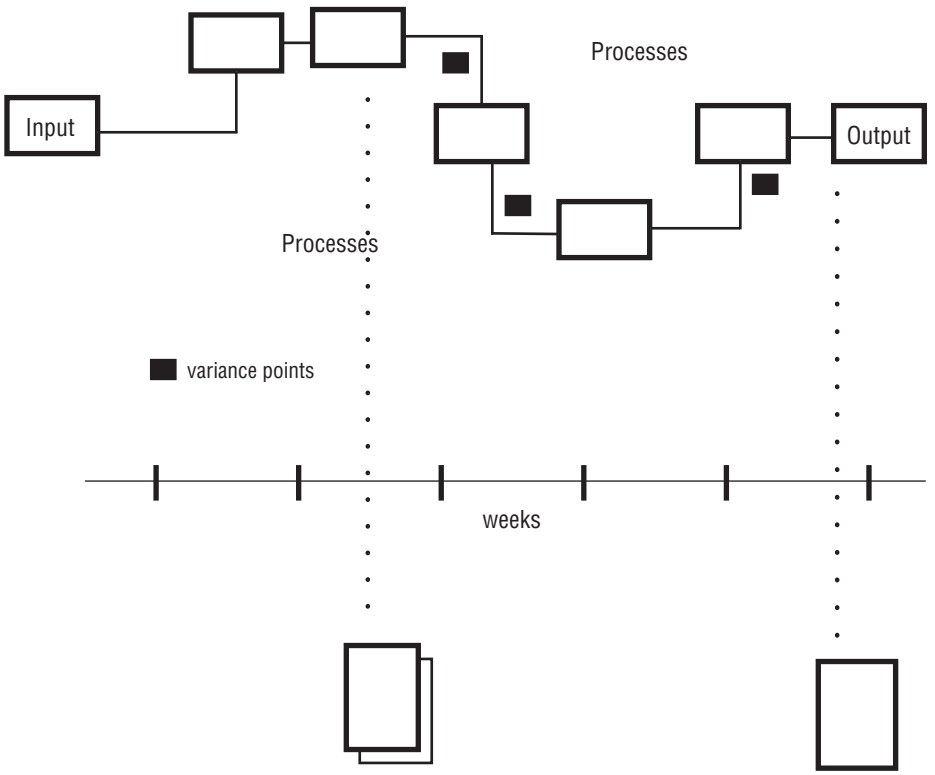


FIGURE 1.3 Model horizontal flowchart with variance points, timeline, and documents.

ing process changes, merging two or more procedures, or developing new procedures. The flowchart also serves as an excellent training tool. It provides new employees with a view in the context of their roles in a larger procedure, as well as providing steps in sequence. The flowchart identifies each element within the process from beginning to end so that everyone involved can view not only their role, but the roles of others as well. When accompanied with the more traditional procedural documentation, this visualized form of process flow is a powerful internal quality control and training tool. A more detailed example of the horizontal flowchart and its practical application—both as a Six Sigma tool and an internal document—is provided in Chapter 6.

THE THREE PRIMARY ELEMENTS: CUSTOMERS, PROCESSES, EMPLOYEES

defect
any outcome that falls short of the customer's needs or expectations.

With Six Sigma, the purpose of the whole exercise is to locate defects, identify ways to prevent them, and make improvements permanent. A *defect* is any outcome that does not satisfy the needs of the "customer."

Key Point In defining a customer, many people are surprised to realize that everyone is in the customer service business—even the clerk who never gets out of the windowless basement office.

You may notice that we have placed quotations around the word "customer." This was done for a good reason: We want to expand the definition of this word. In the widely understood sense, a customer is someone who buys our goods or services. It is usually someone outside the company—a consumer, another company, or the government, for example. In Six Sigma, you may serve a different customer. Those in nonmarketing environments are often described as people who "never see a customer," but this is not an accurate assumption. We all have customers. As a basic definition of a job, we provide something of value to someone else. So your customer may be another department or a group of employees within your own company.

The accounting department usually has little or no contact outside the company. However, it prepares budgets, reports, and payroll checks for a wide variety of departments and people. If someone does not receive their paycheck on the day expected, it means there is a defect in the process within the payroll accounting department. There is little doubt that the department will hear from its "customer" very quickly.

A shipping and receiving department deals with delivery services, the post office, or a trucking company, and is responsible for making sure that any goods to be received or delivered are expedited in a timely manner. If a package does not show up on either end or is delivered to

the wrong address, or the contents are broken in transit, those outcomes have failed to meet the needs of the customer. That customer could be a buyer, a vendor, a clerk in the mail room, or the CEO. We cannot limit the definition of "customer" only to those who buy what our company sells; large numbers of employees deal with other types of customers.

Example: The accounts payable department is responsible for making timely payments to vendors. A marketing employee has promised payment to a valued vendor by the 15th of the month. This promise was mentioned in paperwork forwarded to accounts payable, with a note explaining that the items being purchased were essential for a marketing presentation. The vendor would not make delivery until payment was received. The accounts payable department scheduled payment for the 18th, not realizing that the deadline of the 15th was critical.

In this example, a defect occurred due to a collapse in communication. The flaw in procedure is shared by the marketing employee who did not follow up to ensure that the importance of the timing was comprehended. The accounts payable department assigned a payment date without checking the paperwork thoroughly. This type of failure is typical when process flows from one department to another. The defect cannot be blamed or assigned, because in each case, both sides were involved, and both sides failed to take quality control steps to make sure the defect did not occur. The marketing employee is aware of the customer who requires payment by a specific date, a requisite for timely delivery. The accounts payable employee, however, has not been made aware of his or her customer's needs, because that customer (the marketing employee) did not communicate well enough to ensure a smooth process.

Key Point For the purpose of identifying quality requirements, we need to first understand the customer's requirements and expectations.

It is not difficult to see how a relatively simply change in procedure could eliminate virtually all defects in this type of transaction. If anyone requesting payment were to institute a follow-up procedure, it would improve communication at the source (assuming they followed the procedure, of course). If accounts payable were to check paperwork and then follow up to eliminate any uncertainty, it would also do away with the majority of defective outcomes. This doubled-up procedure would reduce the chances for defects. So the marketing department is expected to follow up and ensure timely payment, and accounts payable is supposed to make sure it knows when payments are to be made. If *either* one follows their procedure, a potential defect will be avoided. The steps to nearly foolproof procedures are often simple, and the resulting changes can be dramatic as well. With human error added into the equation, some defects are going to occur. However, by tracking the flaw, we can again bolster up the procedures so that processes run far more smoothly, and so that human error can be managed and outcomes moved up to a higher Sigma.

Customers, processes, and employees are the three primary elements in operating within the Six Sigma quality control environment. The customer (an end customer in the traditional definition or another department or person in the broader definition) depends on a specific employee or department to operate within the process and to deliver the needed and expected outcome. In this case, the outcome was the *timely* payment. A late payment is a defect. In the accounts payable environment, a *timely* payment may be assumed to be 30 days unless otherwise indicated—remembering, however, that assumptions may themselves lead to defects. So if we are to assume that it is universally understood that the 30-day cycle is in operation unless otherwise specified, we have a starting point. The default presumption is in operation unless someone reads instructions on a check requisition, receives a telephone call, or—lacking any specific information—makes a telephone call to check whether the 30-day default is acceptable.

The interaction between customers, processes, and

employees is complex. Every situation is different, so every definition of a defect is different as well. The accounts payable department might wish to define defects as "late" payments, meaning a payment beyond 30 days. So any request for a check to be issued prior to 30 days is an exception. By this definition, the payment in the example would not be called a defect as long as it was made within the 30-day default period. The problem here is that from the marketing department's point of view, expedited payment is needed and if it is not made, there is a defect. One goal of Six Sigma is to reconcile these different definitions of "defects" from two sides involved in the same process.

Key Point Definition of a customer's requirements may not be the same on both sides of the transaction; we need to come to an agreement about what those requirements are before we can expect to fix or avoid problems.

This demonstrates how an effective quality control system has to go beyond the traditional way that departments and people work with one another. If the definition of a defect is going to be made secondary to an unrealistic definition, then the quality control program is destined to fail. The departmental attitude—"It's not my problem"—has to be replaced with a broader view. If a person chooses to believe that the world is flat, the potential dangers of travel are not an issue as long as that person never leaves home. However, as long as that individual continues to hold onto the flat-world belief, he or she will be of little value if the task at hand is to map out an expedition to distant lands.

Perhaps the accounts payable department is being asked to travel to distant lands and challenge its own assumptions. Under Six Sigma, the department would acknowledge that the assumption based on a 30-day timetable is unrealistic in many instances; they cannot expect the world to conform to the view most convenient to them: universal application of a payment cycle to *all* instances where checks are to be issued. While many payments conform to that model, the nature of accounts

payable is to make a variety of accommodations for its customers (including vendors, other departments, and their fellow employees). These accommodations include the flexibility to cut a check immediately or to accept a variety of deadline terms as part of the payment. In this department, a *defect* results from a flawed assumption. So the very method of processing has to be examined and modified. Instead of viewing a 30-day payment term as the default position, the department needs to begin the process with the question "When is the payment due?" If most payments are due within 30 days, they can be managed according to that procedure; but if some other terms apply, the process has to be set up to manage it. Exceptions can be processed smoothly as long as the system looks for them. It is invariably a mistake to allow the rigid presumptions of a process to overrule the exceptions in the interest of more efficient (but flawed) processes.

That process itself is a primary element in the customer-process-employee interaction, and it has to work with the customers and employees. While this requirement may seem obvious, it is not always put into practice. When the process sets the rules and customers or employees have to conform to it, defects have to be expected. For example, imagine the outcome if a vendor agreed to deliver on condition that payment arrives by the 15th, and the marketing employee responded, "I cannot promise payment until 30 days from now."

You would expect the vendor to refuse to ship, or to have to change the terms to accommodate the marketing employee. These types of unsatisfactory outcomes take place every day. In the case of the vendor and marketing employee, the goods might be delivered, but the vendor's opinion of the company declines. So the defect in this case would be invisible because the goods get delivered—but the goodwill loss, perhaps a significant one, is not visible to anyone observing the process. Some may even shrug it off, observing that the vendor needs the account more than the company needs the vendor, so he or she has to change the fast-payment procedure, "or we will use someone else."

Key Point We should be concerned about losing goodwill with our customers, whether they are found outside the company or in the department down the hall.

Vendor service, a variation of customer service, is often ignored or overlooked in the corporate environment that operates based on process alone. If you are not aware of quality control in all of its aspects, then the processes dominate the interaction. That vendor, who is a customer in every sense, will suffer from the defect. It may be that the goods the vendor is supplying have to be purchased elsewhere to be processed, so the vendor has to invest a large sum of money. This would explain why fast payment is essential, and a reasonable requirement as well. The accounts payable rule that payments go out "net 30" is not always fair or realistic. Flexibility gives you the edge. Your market consists of a range of different customers, and the more you are able to provide a responsive outcome free of defects, the higher the quality of your product.

ADDITIONAL ELEMENTS: SUBCONTRACTORS AND REGULATORS

Vendors and other employees or departments are customers in the quality control environment. The definition of customers is not limited to these, either. You also serve the needs of subcontractors and regulators, who also are your customers.

A "subcontractor" may be another department, an outside provider, or another operating unit within your organization. It is an error to view the subcontractor as a noncustomer. In fact, once you begin looking for customers and treating all contacts as customer service opportunities, the quality in your department or area of responsibility is likely to rise dramatically. As part of the broader operating philosophy of Six Sigma, customer service is not limited to those who buy something from us. We are surrounded by customers, each with a variety of expectations. Whether our product is a report, a check, an answer to a question, or a package, we are providers to

many, and they are our customers. If those outsiders also adopt the attitude that in some respects, you are their customer, the whole process takes on a new face and quality control works throughout the organization—with fewer defects.

We mention regulators in the same section with subcontractors for a good reason. The usual attitude toward regulators deserves a fresh look. Traditionally, we view regulation as an imposition from the outside, and if we did not have to submit, we would not. It provides nothing productive or valuable. Regulation is adversarial, an intrusion.

In the broader view, the regulatory environment can be viewed as a customer as well. Listed companies, for example, have to deal with stock exchange listing standards, federal and state reporting and disclosure requirements, and an independent audit. All of these routines provide something of value. Stockholders would not invest with any confidence if regulators did not examine the books of the corporation. The independent auditor as a service provider relates to the corporation as its customer or client. At the same time, departments within the company provide answers to questions, documents and files, and process suggestions to auditors and to regulators, so in that respect, some internal departments (such as financial reporting and accounting departments and internal auditing) may view regulatory agencies as "customers." If it is their responsibility to comply with the needs of an auditing firm or a federal or state regulator, then those agencies are, indeed, the department's customers.

Key Point The idea of applying customer service to a regulator is contrary to popular thinking, but it makes sense. And it is also good business practice.

While the popular view of regulators is negative, you may view the provider-to-customer approach to working within this environment, thus improving performance. If your job includes compliance with a regulatory agency, taking the customer service approach is appropriate. To the extent that you provide accurate, timely, and useful in-

formation, you improve your performance. Even without viewing a regulatory agency as a "customer" per se, it remains a valid point that your performance should be as excellent as possible. When it comes to regulators, we may remind ourselves that we do not have to like the customer to provide good customer service. You may view regulation as a necessary evil and an inconvenience—just as a busy retail clerk will view a customer with many questions. That clerk performs the task with excellent service by remaining courteous and responsive, even when they would rather usher everyone out and lock the doors.

THE PARTICIPANTS IN SIX SIGMA

Whether you like your customer or not, your customer service system can and should be as defect free as possible—even if only to make your job easier. Under a Six Sigma program, members of your organization are assigned specific roles to play, each with a title. This highly structured format is necessary in order to implement Six Sigma throughout the organization, because the chain of command in your company will not necessarily apply in the Six Sigma environment. For the quality control program to work well, the reporting chain has to be suspended. There are seven specific responsibilities or "role areas" in the Six Sigma program. These are:

leadership council the team or committee that defines the specific goals of a Six Sigma process, the provider of goals to be met by the team.

1. *Leadership.* A leadership team or council defines the goals and objectives in the Six Sigma process. Just as a corporate leader sets a tone and course to achieve an objective, the Six Sigma council sets out the goals to be met by the team. A checklist of some areas the council would undertake as responsibilities is shown in Table 1.2.

By following this list, the leadership council becomes results oriented. You expect any leader to demand and expect the desired outcome, in terms of quality, deadline and problem solving. Six Sigma can work only when results are meaningful and improve overall customer service. This usually will mean higher customer satisfaction due to reduced incidence of defects.

TABLE 1.2 Checklist, Leadership Council Responsibilities

Responsibility	*Description of Duties*
1. Define the purpose of the Six Sigma Program	Definition is the key to initiating any project; the council begins by identifying the reasons for undertaking a specific activity.
2. Explain how the result is going to benefit the customer	Every Six Sigma program is aimed at meeting the needs of the customer; improving performance; and reducing the incidence of defects. The program needs to be structured in these terms.
3. Set a schedule for work and interim deadlines	The project is broken down into logical sequence and phases, each with deadlines for (1) review, (2) change, and (3) final version.
4. Develop a means for review and oversight	As the project progresses, work is monitored to ensure it is on track and properly focused. This phase also ensures that each team member is executing responsibilities as expected.
5. Support team members and defend established positions	The real leadership in Six Sigma is demonstrated by how well the council defends the process. Enthusiastic adherence to Six Sigma principles ensures that the team will remain cohesive.

sponsor the problem solver within a Six Sigma project, usually a manager who implements the orders passed down by the council; often the process owner, or person who is ultimately responsible for completing a process.

2. *Sponsor.* The individual in the sponsor role acts as a problem solver for the ongoing Six Sigma project. Usually a senior manager within the company, the sponsor implements the leadership council's orders and smoothes out any conflicts that arise. The sponsor often has a keen sense of the need for a Six Sigma process because he or she will end up managing the process after the team has revamped it. The sponsor's responsibilities are listed in Table 1.3.

3. *Implementation leader or director.* The implementation leader is responsible for overseeing the entire Six Sigma effort for a team (or group of teams). He or she supports the leadership team or council by ensuring that their mandate is implemented; recommends people for important roles on a Six Sigma team, either from within the company or from outside resources; ensuring success

TABLE 1.3 Checklist, Sponsor Responsibilities

Responsibility	*Description of Duties*
1. Maintain focus on the goals defined by the leadership	The sponsor ensures that team members keep the ultimate goal in mind and keep focused toward it.
2. Supervise and train team members as needed	The sponsor acts as supervisor, making sure that team members understand their tasks and know how to complete them. When extra training or support is needed, the sponsor provides it.
3. Act as representative of the team with the leadership	As work progresses, the sponsor represents the team and, when necessary, defends them or speaks for them as representative.
4. Find and manage needed project resources	Six Sigma work is not always performed within a single area or department. The sponsor acts as go-between when help is needed between departments or operating units.
5. Mediate any conflicts or disagreements within the team or with outside areas	Individuals within one team may find themselves in conflict with one another; or the work of the team might be in conflict with another team. The sponsor is a coordinator, responsible for solving this problem.

of the implementation plan and solving problems as they arise; training as needed; and assisting sponsors in motivating the team.

4. *Coach.* The term coach implies a trainer or guide. In the Six Sigma team, the coach serves as an expert or consultant to the team and its members. Duties include working as go-between for sponsor and leadership; scheduling the work of the team; identifying and defining desired results of the project; mediating disagreements, conflicts, and resistance to the program; and identifying success as it occurs.

5. *Team leader.* The day-to-day work of the Six Sigma team is managed by the team leader. Responsibilities include communication with the sponsor in defining project goals and rationale; picking and assisting team members and other resources; keeping the project on

implementation leader the person responsible for supervising the Six Sigma team effort, who supports the leadership council by ensuring that the work of the team is completed in the desired manner.

coach
the Six Sigma expert or consultant who sets a schedule, defines results of a project, and who mediates conflicts or deals with resistance to the program.

schedule; and keeping track of steps in the process as they are completed.

6. *Team member.* A team can have a number of definitions within the organization. It often refers to a group of people working together from different units or departments. The team members execute specific Six Sigma assignments and work with other members of the team within a defined project schedule, to reach specifically identified goals.

7. *Process owner.* The process owner ends up with an improved procedure, or is assigned responsibility for executing processes newly designed by the team.

team leader
the individual responsible for overseeing the work of the team, and for acting as go-between with the sponsor and the team members; the person who manages the schedule.

It may seem that there are an unnecessarily large number of layers in the Six Sigma process. Why the formality? First, we need to clarify that these rules represent a maximum number of tiers in a Six Sigma process, but they are not all required. Some may be combined and executed by the same person. In a very complex project involving many different departments and requiring a long time for completion, a highly structured procedure—with frequent review, strict oversight, and well-defined responsibilities—is desirable. In a shorter-term project involving only one or two departments, the structure of the Six Sigma organization can be more abbreviated.

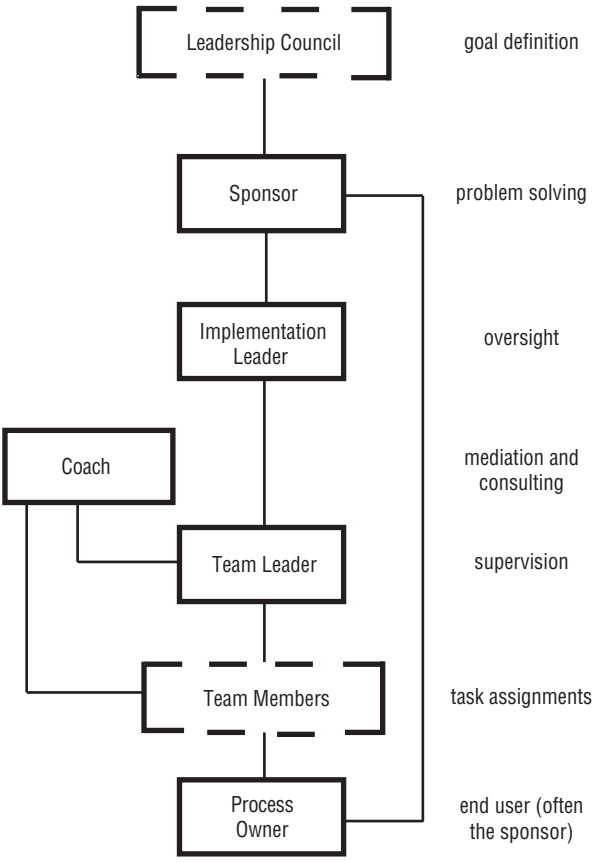
team member
an employee who works on a Six Sigma project, given specific duties within a project, and deadlines to meet in reaching specific project goals.

Key Point The multiple layers and titles in a Six Sigma operation often can be reduced or combined. The formalized structure allows for flexibility, so that projects of all sizes can be managed appropriately within the Six Sigma approach.

The organization of the overall Six Sigma system is summarized in Figure 1.4.

PARTICIPANT WITHIN SIX SIGMA

Many labels have evolved over the years that Six Sigma has been in use. These labels originated at founding com-



process owner the individual who takes on responsibility for a process after a Six Sigma team has completed its work.

FIGURE 1.4 Organization of the Six Sigma program.

pany Motorola, but the definitions have been extended by other users since then.

The assignment of belt colors to various roles is derived from the obvious source, martial arts. At the top of the achievement level in karate, for example, is the *Black Belt*. The person possessing this belt has achieved the highest skill level and is an experienced expert in various techniques. As applied to the Six Sigma program, the individual designated as a Black Belt will have completed a thorough internal training program and have experienced work on several projects. The black belt holder is usually given the role of team leader, the person who is responsible for execution and scheduling.

Black Belt An experienced participant in the Six Sigma process, usually given the role of team leader, who is responsible for ensuring that the benefits of Six Sigma projects are realized.

Master Black Belt
a consultant (sometimes the coach) available to the Six Sigma team to resolve technical issues or to answer questions.

Another level is the *Master Black Belt*, a person who is available to consult with the team or its leadership but who is not a direct member of the team itself. This may be the equivalent of the role played by the coach; or for more technical and complex projects, the Master Black Belt is available to answer procedural questions and to resolve the technical issues that come up.

The *Green Belt* designation can also belong to the team leader or to a member of the team working directly with the team leader. Referring back to the source designations, a karate green belt is less experienced than the black belt but is cast in a key role within the team.

Green Belt
the sponsor or a key team member with a degree of experience above the average team member, or who plays a key role in helping the sponsor manage the scheduling and assignments within a project.

These colorful names were originally intended to add a descriptive sense to the otherwise dry roles of leader, sponsor, and other well-known but overused corporate titles. However, there is also a danger in overdefining roles. The roles performed by council, sponsor, implementation leader, team leader, coach, and team members should be clarified as much as possible; and those levels combined when possible to keep the process simple and efficient. The advantage of describing a role or series of responsibilities in terms of belt colors may be helpful in exhibiting an individual's team experience and ability. The distinction between the actual designation and the belt color should not confuse the roles played by each participant on the team.

Key Point The belt names are one tool for defining levels of expertise and experience. They do not change or replace the organizational roles in the Six Sigma process.

GOALS OF THE PROGRAM

In any undertaking that is going to place demands on time, budgets, and other resources, we need to begin with a definition of the perceived benefits we hope to derive. In the case of a corporate-wide Six Sigma program, the intention is to change the entire corporate culture for the better.

Beginning with the traditional customer—the re-

ceiver or products or services that we provide—it is apparent that the best internal systems cannot be developed in isolation. In some respects, we learn from our mistakes so that an exceptional system is the result of trial and error. However, such a system may also be developed by listening to the customer. If customer satisfaction is the primary focus of a Six Sigma program, we cannot ignore the customer's expectations, because that set of expectations defines quality and enables us to spot defects. The questions that every corporate leader and employee should be asking are based on acknowledging that the customer *defines* quality itself. As GE's former CEO explained:

The best Six Sigma projects begin not inside the business but outside it, focused on answering the question, How can we make the customer more competitive? What is critical to the customer's success?[2]

Customer satisfaction is the essential and defining concern for all quality programs. If we also extend that definition so that *all* of us deal with a "customer" in some manner, then the smart theories of improved customer relations can be applied across the entire organization. One of the beliefs that harms morale among nonmarketing employees is the polarizing observation that they never see or speak to a customer. So an elite subculture arises, in which marketing employees bring in the profits while nonmarketing people merely shuffle paper. This is one of the most damaging themes seen in corporations, and it is most pronounced in companies involved with marketing directly to customers.

Key Point The belief that there are two kinds of employees—those who see customers and those who do not—is damaging to morale and impedes the development of a quality control system. Everyone has a customer, and once this is recognized, the real job of creating a company-wide team can begin.

So as a goal, it is not enough to define the program as aimed toward improving customer service; it should also extend that definition so that everyone, even those

merely shuffling papers, can adopt the same attitude focused on improved customer service. This brings us to a second goal of any quality control program: employee involvement. As a member of a department, an employee is likely to be expected to focus very narrowly on specific functions, deadlines, and procedures. These processes are often best performed in an isolated manner, while a supervisor or manager worries about interaction with other departments or with management. Depending on the type of department, the limitation of processes often makes sense. When it comes to a broader involvement in and participation in quality control, that same employee is given a different type of incentive. This ownership over processes—derived from developing improved, more creative, more efficient, or more profitable methodology—is satisfying and rewarding and may give the employee a sense of real participation. This satisfaction may be lacking in the departmental routines and attendant deadlines. So quality participation can do a lot to improve employee morale. Allowing people to define how processes can be improved is perhaps the single most important step a company can take to improve morale among its employees.

In defining customers, we may also look at employees in that light. In many respects, the employee is the "customer" of the department supervisor or manager, the vice president, and the CEO. Management has a responsibility to the company's employees and, if we are to include vendors as "customers," we should certainly extend the same status to employees—and for good reason. If we exclude the employee from the broad definition of "customer," then we cannot expect that employee to respond to improved internal processes that come from Six Sigma projects. Any project that improves service to customers or vendors has to also improve the quality of corporate life for employees. Positive change invariably has that effect, but we have to be aware that we need to change a cultural attitude. Six Sigma participation is intended to help employees—whether marketing or administrative—to move beyond the demoralizing characterization of some employees as having no customer contact.

Finally, we expect Six Sigma to work universally. So the same redefined "customer" embraces the subcontractor and even the regulator. A subcontractor may be a company that works within the corporate structure without being a part of the formal reporting chain, such as a consulting firm, for example. And while applying a standard of customer service to those agencies within the regulatory environment may seem odd, it makes perfect sense. In defining the types of defects we expect to see when dealing with the regulatory customer, we conclude that improved quality is beneficial to everyone.

For example, a regulator may be interested in ensuring that disclosures are made properly to investors. (This would apply to federal and state securities agencies and to stock exchanges for companies that are publicly listed.) So a department or team whose task is to ensure compliance with the disclosure rules should be interested in discovering internal defects; identifying their causes; and making recommendations to fix the root problems. This is the ultimate outcome at any rate, although the requirement often is imposed by the agency at the conclusion of an audit. It makes more sense to look for those problems and fix them internally as a response to the requirements of the customer—in this case a regulator.

Six Sigma truly does apply over the whole spectrum of the organization, not only because it is intended to create a universal team, but also because it simply makes sense. Quality control defined as a method for cutting costs only, without the complete involvement of management, may be sold as a means for improving morale. But the failure of such programs is due to the real effect they have always had: reducing employee morale. Once we address every problem from the customer's point of view, we begin to see how and why corporate-wide quality is the most sensible system. This is the subject of the next chapter.