Most people at one time or another have thought about trying to do something better. It might have been at home or at work, in recreation or business, for friends or customers. Thinking about doing something better is often easy—actually making a change usually is not. What is the best way to approach trying to make a change that results in improvement?

Throughout history, people have used trial and error as an approach to improvement. This approach is often defined as making a change and then seeing if anyone complains, or if something stops working because of the change. The trial-and-error approach, which can be carried out with various degrees of sophistication, has sometimes been criticized as jumping to solutions without sufficient study both before and after the trial. In response to this criticism, some people have turned to extensive study of the problem before a change or trial is attempted. This approach can lead to paralysis. Focusing on the key principles of change and improvement should allow us to take advantage of the best of these two approaches. The three questions introduced in the following section provide a framework for this balance. Use of these questions will allow people to turn their thoughts about improvement into successful actions.

**Fundamental Questions for Achieving Improvement**

Improvement come from the application of knowledge—of medicine, engineering, teaching, driving a truck, or simply the way some activity is currently done. Generally, the more complete the appropriate knowledge, the better the improvements will be when the knowledge is applied to making changes. Any approach to improvement, therefore, must be based on building and applying knowledge. This view leads to a set of fundamental questions, the answers to which form the basis of improvement:
The Improvement Guide

- What are we trying to accomplish?
- How will we know that a change is an improvement?
- What changes can we make that will result in improvement?

For ease of reference, these three questions will at times be referred to as the first, second, and third improvement questions. In practice, the questions can be answered in any order.

These questions provide a framework for a "trial-and-learning" approach. The word "trial" suggests that a change is going to be tested. The term "learning" implies that criteria have been identified that will be used to study and learn from the trial. Focusing on the questions accelerates the building of knowledge by emphasizing a framework for learning, the use of data, and the design of effective tests or trials. This approach stresses learning by testing changes on a small scale rather than by studying the problem before any changes are attempted.

Although the chapters in Part One focus on using these questions to guide improvement efforts, it is worth pointing out that many people have also found these questions useful in performing their day-to-day work. For example, managers often give their employees assignments that are not clearly defined. The manager assumes that the employee understands the aim and the expected results. Giving or receiving assignments by providing answers or partial answers to the three questions would improve managerial processes.

The following example will help clarify the application of the three questions.

The Parkside diner has been in business at the same location for ten years. During this period the diner has built a reputation for good food and service. Recently, however, customers have been complaining that they are spending more than one third of their lunch break waiting to order and get their food. Since the diner thrives on customers who have only thirty to forty-five minutes to eat, both its reputation and business would suffer if something was not done.

The owners of the diner decided to do something about the long lines that were occurring every day. Their answer to the first improvement question—What are we trying to accomplish?—was that they wanted to make changes in how they prepared for and ran their lunch business so that their customers would receive better service.

The key idea in answering the first question is to provide an aim for the improvement effort that will guide and keep the effort focused. The use of data, especially data related to what customers think is important, is often useful to make sure the aim is focused in the right area. A common pitfall is to spend too
much time trying to get the perfect answer. A good rule of thumb is to keep the answer short and concise.

After discussions with their employees, several important facts came to light:

- Customers were waiting in line for up to fifteen minutes.
- Tables usually were available.
- Many of their customers were regulars.
- People taking the orders and preparing the food were getting in one another's way.

To measure the improvement that might result from any change they made, they decided to collect data during lunch on:

- The number of customers in line
- The number of empty tables
- The time it takes each customer to get served

Criteria or measures need to be identified to answer the second improvement question: How will we know that a change is an improvement? If they made a change and these measures got better over time, they would then conclude that the change led to improvement. The effectiveness of the effort to improve depends in part on the ability to measure these criteria. Having data available for determining the impact of the changes will enhance the learning. Both the owners and the employees of the diner will be able to sustain improvements through common understanding.

The diner's owners and employees spent some time one afternoon attempting to answer the third improvement question—What changes can we make that will result in improvement?—specifically, what changes could they could make that would improve the service to their customers at lunchtime. They developed changes that they believed would have an impact on the criteria they had come up with earlier. Some of the changes suggested were:

- Change the menu
- Move to a new location
- Change the layout of serving, dining, and food preparation areas
- Have regular customers phone in their orders ahead of time
- Add another cash register
- Have regular customers fax in their orders ahead of time

The term “learning” referred to as the first, “changing” approach. The term “learning” study and learn from the design of effective changes on a small scale when changes are attempted.

The questions to guide people have also found clearly defined. The aim and the expected answers or partial answers are a part of the three questions.

For ten years. During this time, however, customers who have been in line for up to fifteen minutes would suffer if something was occurring lines that were occurring. What are we trying to get prepared for and ran the service.

Provide an aim for the process. The use of data, in fact, is often useful to avoid the pitfall is to spend too much time trying to get the perfect answer. A good rule of thumb is to keep the answer short and concise.
Once the list of possible changes had been developed, the owners of the diner needed to develop a plan to test a change. The plan included collecting information on customers waiting in line, the number of tables available, and how long it takes a customer to get served.

Testing is done to evaluate the impact of a change and to learn about different alternatives. The goal is to increase the ability to predict the impact that one or more changes would have if they were implemented. The plan for the test should cover who will do what, when, and where.

**The PDSA Cycle**

Testing a change is not always easy. Things may happen that were not planned. The change may not impact the measures. There may be unwanted side effects. To help people develop tests and implement changes, we suggest the use of the PDSA (Plan, Do, Study, Act) Cycle as the framework for an efficient trial-and-learning methodology (see Figure 1.1). The cycle begins with a plan and ends with action based on the learning gained from the Plan, Do, and Study phases of the cycle.

The use of the word “study” in the third phase of the cycle emphasizes that the purpose of this phase is to build new knowledge. It is not enough to determine that a change resulted in improvement during a particular test. As you build your knowledge, you will need to be able to predict whether a change will result in improvement under the different conditions you will face in the future.

**Using the PDSA Cycle**

The owners of the diner decided to test a change but to limit their change to one that would cost less than $500. The following discussion shows what they accomplished within each phase of the cycle.

**The Plan Phase** The owners predicted that changes that would allow them to prepare orders ahead of time would reduce waiting during lunchtime. The changes that they settled on were:

- Provide a way for customers to fax their orders in ahead of time (rent a fax machine for one month).
- Construct a preparation table for fax orders in the kitchen, where there was ample room.
- Devote one of the two cash registers to handling faxed orders.
The owners of the diner wanted to learn about different ways to place orders and the impact that one method might make. The plan for the test included the following four phases:

- **Plan**
  - Change or test.

- **Act**
  - Determine what changes are to be made.

- **Study**
  - Summarize what was learned.

- **Do**
  - Carry out the plan.

Since it would take a few weeks to get the phone line and the fax machine and to inform customers of the new way to place orders, the owners decided to use this time to collect data on the important measures. Both the length of the line and the number of empty tables would be measured every fifteen minutes during the lunch hour by one of the owners. In addition, when the fifteen-minute line check was done, the owner would note the last person in line and measure the time until that person got served.

**The Do Phase**

The data collection was continued for three weeks after the change was made. Some problems with keeping track of the recorded numbers were eliminated once a form to record the data was created and put on a clipboard by the front cash register.

**The Study Phase**

Several improvements were detected. Time spent waiting in line went from fourteen minutes before the change to an average of five minutes after the change. To visualize the impact of the change, they plotted the time spent waiting in line before and after the change (see Figure 1.2). The line length was cut to a peak average of twelve people. The number of empty tables decreased slightly.

**The Act Phase**

After a meeting with all employees to discuss the results of the test, the owners decided to:

- Purchase the fax machine they had rented.
- Prepare phone orders at the preparation table constructed in the kitchen for the faxed orders.
- Use both cash registers to handle walk-in and faxed orders.
The owners of the diner could use additional cycles to refine or monitor the above changes or to test other changes. This approach is in contrast to using one cycle to attempt to accomplish everything. The use of multiple cycles for sequential testing and implementation reduces risk as the change process progresses from hunches, theories, and ideas to actual changes that result in improvement. The concept of multiple cycles is depicted in Figure 1.3. Remember, not every idea for change will result in improvement. Try to test changes on a small scale whenever possible in order to minimize the negative consequences of a failed test. The owners of the diner realized that much can be learned from testing a change on a small scale, regardless of whether the change results in improvement.

**Implementing the Changes**
The owners of the diner used a second cycle to implement the changes that were successful during the first test. Implementing a change means incorporating it into the day-to-day activities of a process or service or into the next version of a product. If attention is not paid to implementation, the improvements that were seen when the change was tested can dissipate over time.

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**The Plan Phase**

To make the fax ordering part of the day-to-day operations of the diner, the owners decided to document the faxed-order process and then train all their employees in it. In addition to the owners, two employees were trained on the use and maintenance of the fax machine. The owners also decided to continue monitoring the three types of data: time in line, number of empty tables, and number of people in line. They felt, however, that monitoring once a day during the peak rush hour (beginning of
The Model for Improvement

Combined, the three questions and the PDSA Cycle form the basis of the Model for Improvement (see Figure 1.4). The model is an improvement framework that is both widely applicable and easy to learn and use. The diner example demonstrated the application of the model. The focus on
the three questions and the cycle allows for the application of the model to be as simple or as sophisticated as necessary. Efforts may differ based on the complexity of the product or process to be improved; in terms of whether the effort is focused on a new design or on a redesign; based on the depth of knowledge possessed by those people closest to the process or product; or because of the number of people involved in the improvement effort.

Because of these differences, application of the improvement model will vary in terms of the formality of the approach. A more formal approach might increase the amount of documentation of the process, the complexity of the tools used, the amount of time spent, the amount of measurement, the amount of group interaction, and so on. Figure 1.5 shows eight different improvement activities on a scale of the formality of approach that may be required. They range from an individual improving a hobby to a national effort to redesign a national system such as Medicare. Part Two of this book (Chapters Four through Eight) discusses how the application of the model can accommodate these diverse activities.
Allred for improvement
Redesign a national system (e.g., Medicare)

<table>
<thead>
<tr>
<th>Improve a family's shopping</th>
<th>Improve a process in an organization</th>
<th>Design a new product</th>
<th>Redesign a national system (e.g., Medicare)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improve one's golf game</td>
<td>Improve service at a diner</td>
<td>Reengineer a subsystem</td>
<td>Reengineer an organization</td>
</tr>
</tbody>
</table>

Least documentation, tools, time, more Documentation, tools, time, more
Formal and Complex less required group interaction, measurement, and so on, more required
Complex

Figure 1.5. Scale of Formality of Approach for Improvement Efforts.

Conclusion

Improvement comes from the application of knowledge. This chapter has introduced the Model for Improvement, which provides a framework for individuals and groups to gain and apply knowledge to the improvement of a wide variety of endeavors. The next chapter discusses five areas of knowledge that will increase the ability to make changes that result in improvement.