CHAPTER

4

Flowcharting: Drawing a Process Picture

INTRODUCTION

"One picture is worth a thousand words." If we may modify this age-old proverb and expand it a little to cover your business processes, it might read, "A flowchart is worth a thousand procedures." Flowcharting, also known as *logic* or *flow diagraming*, is an invaluable tool for understanding the inner workings of, and relationships between, business processes. This chapter is designed to help the process improvement team (PIT) member accomplish the twofold task of:

1. Understanding some of the available flowcharting techniques
2. Applying these techniques to understand business processes

Flowcharting is defined as a method of graphically describing an existing process or a proposed new process by using simple symbols, lines, and words to display pictorially the activities and sequence in the process.

WHAT ARE FLOWCHARTS?

Flowcharts graphically represent the activities that make up a process in much the same way that a map represents a particular area. Some advantages of using flowcharts are similar to those of using maps. For example, both flowcharts and maps illustrate how the different elements fit together.

Consider Figure 4.1, a flowchart of the process for hiring a new employee in the fictitious HJH Company. The process begins with a recognition of the need to hire someone and ends with the employee reporting to work. This brief overview of the major activities in the process enables those who understand how to read this story to quickly compare the ways in which HJH's hiring process resembles and differs from that of other companies. For example, you easily can see that HJH emphasizes hiring from inside the organization.

Another advantage is that constructing flowcharts disciplines our thinking. Comparing a flowchart to the actual process activities will highlight the areas in which rules or policies are unclear or are even being violated. Differences between the way an activity is supposed to be conducted and the way it is actually conducted will emerge. Then, with just a few short steps, you and your colleagues will be able to determine how to improve the activity. Flowcharts are a key element in business process improvement (BPI). Good flowcharts highlight the areas in which fuzzy procedures disrupt quality and productivity. Then, because of their ability to clarify complex processes, flowcharts facilitate communication about these problem areas.

FLOWCHARTING OVERVIEW

Flowcharting an entire process, down to the task level, is the basis for analyzing and improving the process. Assigning portions of the process to specific team members will speed up what can be a time-consuming task.

Every situation and/or process will present unique charting problems. The team will have to deal with them as they arise. For instance, existing documentation seldom is sufficient to allow flowcharting of every task and activity without talking to the people performing the tasks. Be careful to distinguish between what the documentation says should be done and what actually is done.

There are many different types of flowcharts, each with its own use. You must understand at least four of these techniques to be effective in the PIT. They are:

1. Block diagrams, which provide a quick overview of a process

2. The American National Standards Institute (ANSI) standard flowcharts, which analyze the detailed interrelationships of a process
3. Functional flowcharts, which depict the process flow between organizations or areas
4. Geographic flowcharts, which illustrate the process flow between locations

BLOCK DIAGRAMS

A block diagram, also known as a *block flow diagram*, is the simplest and most prevalent type of flowchart. It provides a quick, uncomplicated view of the process. Figure 4.1 is a block flow diagram that provides an overview of the hiring process. Rectangles and lines with arrows are the major symbols in a block flow diagram. The rectangles represent activities, and the lines with arrows connect the rectangles to show the direction of information flow and/or the relationships among the activities. Some block flow diagrams also include elongated circle start and stop symbols to indicate where the flowchart begins and where it ends.

Use block diagrams to simplify large, complex processes or to document individual tasks. Include a short phrase within each rectangle describing the activity being performed. Keep these descriptive phrases (activity names) short.

Let's decode the story told in Figure 4.1.

Activity 1. A manager recognizes a need for another employee because of high overtime, an employee leaving, etc. To fill this need, he or she must complete the required forms and get the proper approvals.

Activity 2. The appropriate people review the request for a new employee and approve or reject it. This approval may result in a budget increase. After the necessary approvals are obtained, the approved request is sent to personnel.

Activity 3. Personnel looks for internal candidates who have been recommended for promotion or transfer who also meet the needs of the job. The HJH Company does not post jobs. A list of candidates, along with their personnel files, is sent to the requesting manager.

Activity 4. The manager reviews the files and arranges to interview suitable candidates. Then he or she notifies personnel of the results of the review and the interviews.

Activity 5. If one of the candidates is acceptable, go to activity 10. If not, continue to activity 6.

Activity 6. Personnel conducts an outside search for candidates by

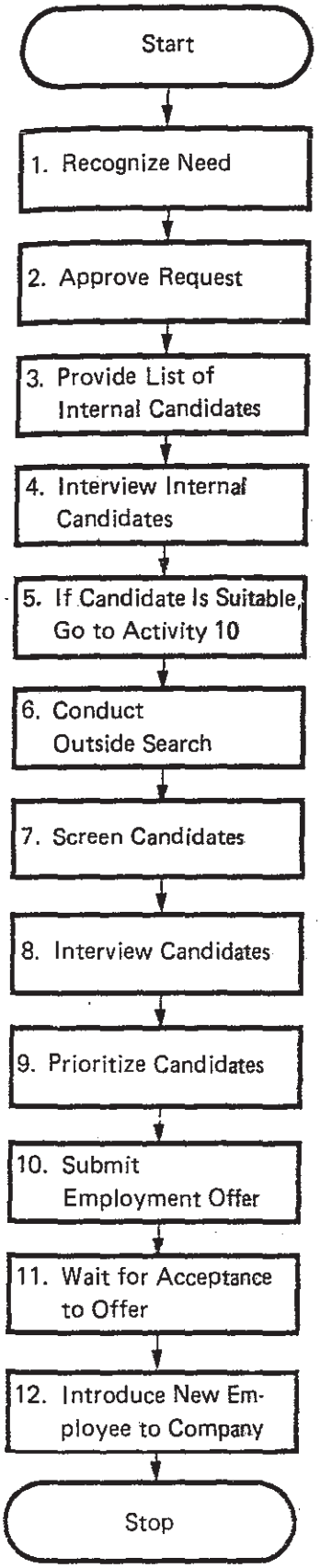


Figure 4.1 Hiring process at HJH Company.

running ads in newspapers, reviewing on-file applications, hiring a search firm, etc.

Activity 7. Personnel reviews potential candidates' applications and conducts screening interviews with the best candidates. Then interviews are set up between the manager and the most promising candidates.

Activity 8. The manager interviews the candidates.

Activity 9. The manager prioritizes the acceptable candidates and sends this list to personnel.

Activity 10. Personnel submits an employment offer to the best candidate.

Activity 11. The company waits for the candidate's response. If the offer is rejected, activities 10 and 11 are repeated for the next candidates on the priority list. Once the offer is accepted, go to activity 12.

Activity 12. Personnel arranges for the employee to report to work, familiarizes him or her with company procedures, and presents the employee to the manager.

As you can see, many activities are performed within each rectangle. If desired, each rectangle can be expanded into a block diagram of its own. Figure 4.2 takes the first activity in Figure 4.1 and explodes it into a more detailed block diagram comprising the following activities:

Activity 1. The manager analyzes the amount of overtime to determine whether a new employee could reduce it sufficiently to offset the cost of his or her salary and benefits.

Activity 2. He or she reviews the procedure for acquiring a new employee.

Activity 3. The manager asks personnel to send blank personnel requisition forms and budget variation forms.

Activity 4. He or she fills out forms.

Activity 5. He or she prepares a job description for the new job.

Activity 6. He or she reviews with the second-level manager and gets a sign-off.

Activity 7. The manager mails the job description, budget change request, and employee requisition form to the controller for approval.

Even in Figure 4.2, some of the activities could be broken down into individual task flowcharts. For example, how to write a job description easily could be a separate block diagram.

Notice that the label description of each activity begins with a verb. Although not mandatory, following this practice is a good general rule. Standard phrasing speeds understanding for the reader. In addition, all

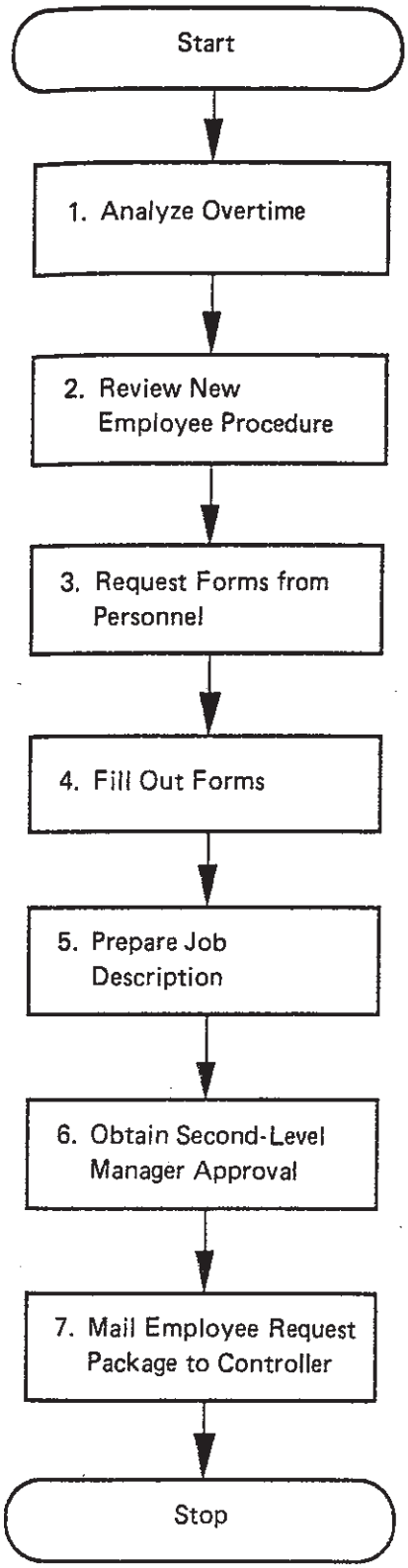


Figure 4.2 Management action required to obtain a new employee approval.

business activities can be described by a verb. Thus, by starting each block label with a verb, you ensure that the label does, in fact, describe a true business activity.

If there are conditional statements in your flowchart, you may not be able to begin every label with a verb. For instance, in Figure 4.1, activity 5 begins with a conditional statement, "If candidate is suitable, go to activity 10." The rule of using a starting verb is still followed—immediately after the conditional statement.

Block diagrams can flow horizontally or vertically. Figures 4.1 and 4.2 flow vertically. Figure 4.3 is a block diagram of a barbecue that is plotted horizontally to the page. Despite the change, the diagram still leads you through the process in a logical way.

Block diagrams provide a quick overview of a process, not a detailed analysis. Normally, they are prepared first to document the magnitude of the process; then another type of flowchart is used to analyze the process in detail.

Typically, many activities and inputs are intentionally not detailed in a block diagram; therefore, a very simple picture of the total process can be drawn. Consider activity 4 in Figure 4.3: "Develop menu." Many activities and inputs must go into developing a menu for the barbecue. The typical inputs required are:

1. The amount of money to be spent
2. Guests' preferences
3. What we prepare well

The typical activities include:

1. Listing the items to be served
2. Listing the materials needed for the menu
3. Getting money to pay for the food and condiments

It is easy to see how each of the blocks in the block diagram can be exploded to provide a detailed picture of how the activity is performed. Don't worry if all the process details are not documented in the block diagram. The detailed activities will come later in the flowchart process.

Figure 3.3 in Chapter 3 is another way of flowcharting the summer barbecue process depicted in Figure 4.3. Figure 3.3 is plotted vertically, and responsibility for each activity has been assigned to a specific person or persons. The name or title of the person responsible for the activity is indicated in the open-ended rectangle. This symbol is called an *annotation symbol* since it is used to provide additional information about the activity. A broken line leads away from the activity to the annotation symbol. The broken line is used so that the reader will not mistake it for a direction flow line. The arrow leads away from the block diagram activity and points to the person or persons responsible for that activity. When your organiza-

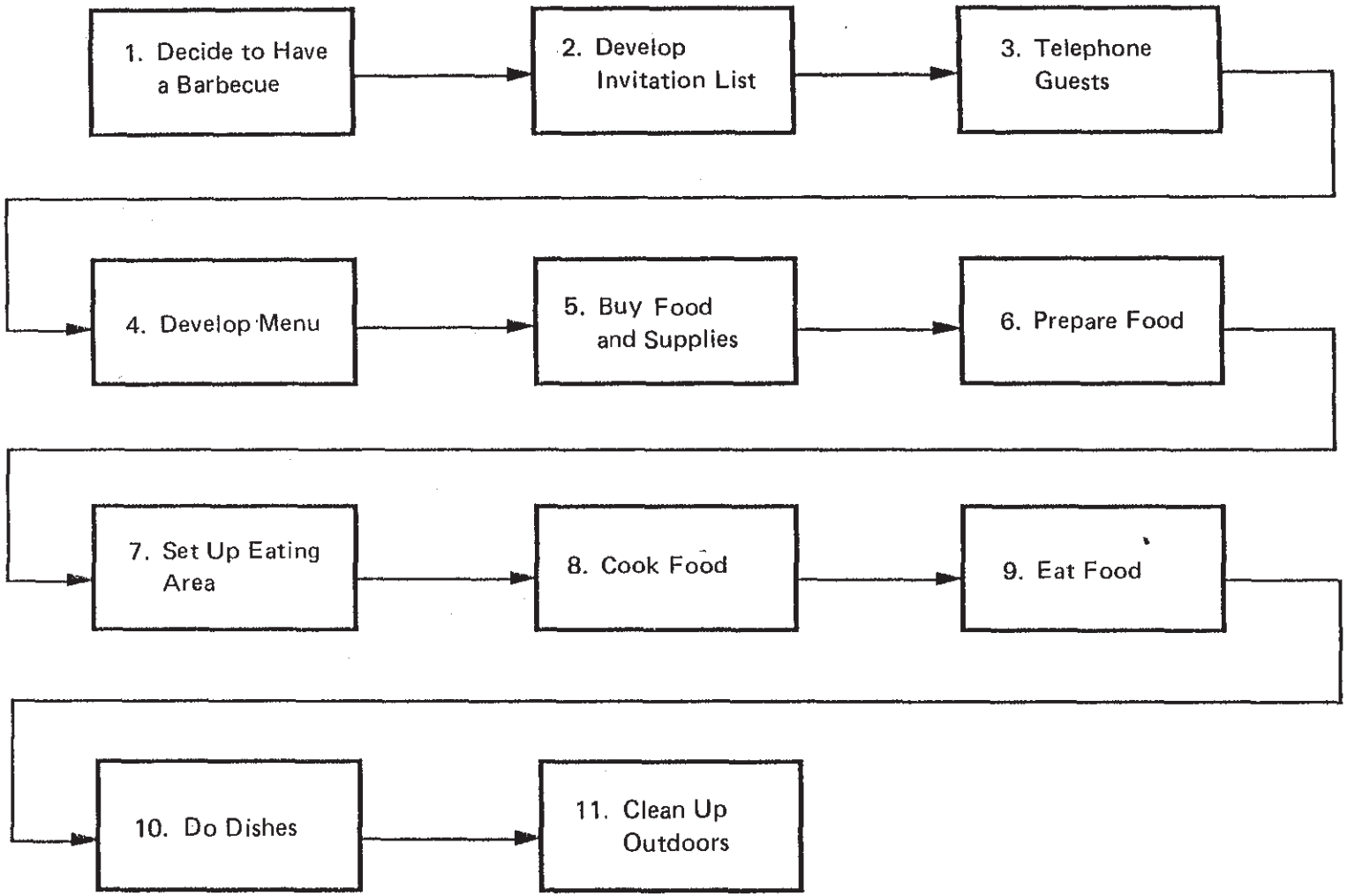


Figure 4.3 Block flow diagram for conducting a barbecue.

tion uses block flow diagrams to chart a set of business activities, you may indicate responsibilities differently. You may use the name of a department, the job titles of employees and managers, or the actual names of the individuals in denoting responsibilities.

The purpose of flowcharting is to paint a picture that is easy for your team to understand and use. You can modify rules, such as starting each activity name with a verb or using annotation symbols in place of the activity owner's name within the activity rectangle, if doing so significantly improves the understandability and use of the flowchart. However, given that any nonstandard deviation may confuse other people within the organization using the flowchart at a later date, it is a good idea to have the executive improvement team (EIT) establish a complete list of symbols at the beginning of the BPI activity to minimize deviations.

It is good practice to start your business process flowcharting by block diagraming the process. The block diagram can be used to help define which of the other flowcharts best provides a detailed understanding of the tasks within the process.

BLOCK DIAGRAMING ACTIVITIES AND INFORMATION

A process is also likely to have a communication system, with its own separate and distinct flow, superimposed on the flow of activities. This communication system also must be recognized, flowcharted, and understood as an integral part of the process operations.

An organization chart is a type of block diagram. In this case, the reporting structure is pictured. An organization chart shows how authority, responsibilities, and activities are delegated down into the organization.

Figure 4.4 presents a typical organization chart. The organization flow is represented by solid lines, while the communication system is indicated by dotted lines. The communication flow in most organizations is an essential, but complex, part of the organizational structure. A good communication system flows up, down, and sideways. Frequently, a communication flow line will have arrows on both ends, signifying two-way communication. A typical two-way communication would be a meeting at which everyone is invited to contribute to the discussion. As you can see, the communication flow is much more complex than the organization flow.

Figure 4.4 reveals some interesting patterns. Mid-level department A2 is not part of upper management's communication flow and, as a result, holds meetings with departments A1 and A3 in an attempt to communicate its concerns to upper management. Typically, A2 meets first with A1 to obtain a status report, and then meets with A3 to verify the information obtained at the first meeting.

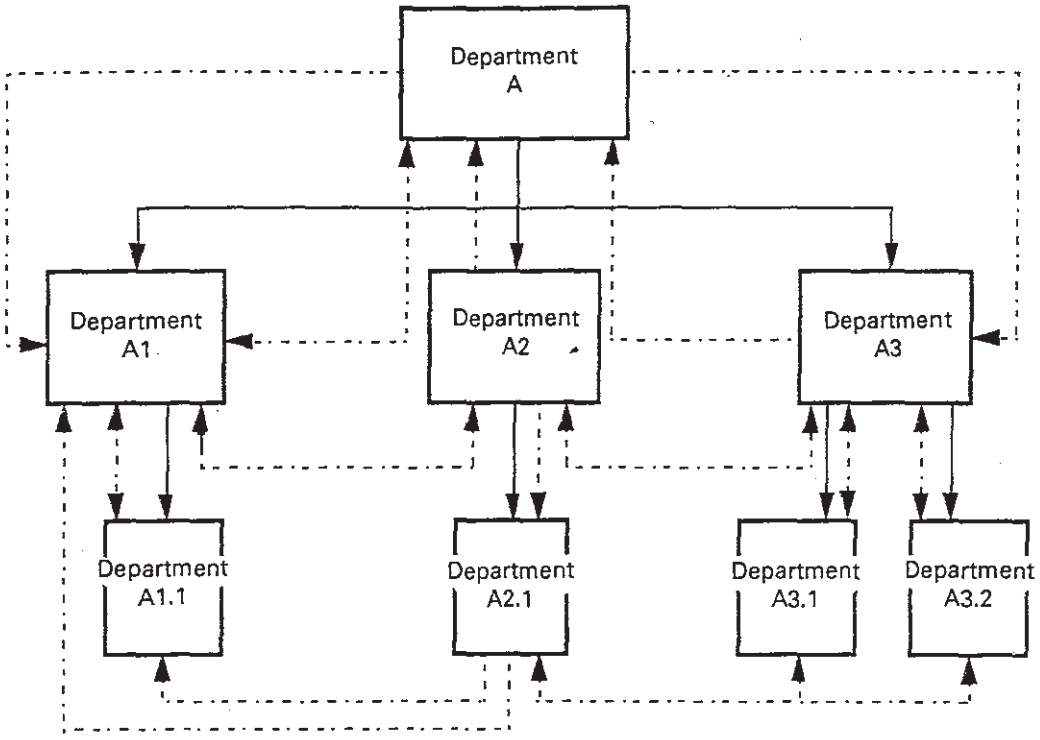


Figure 4.4 A block diagram with its communication systems added with broken lines.

Unfortunately, this pattern is repeated at lower levels because, while the manager of department A2 communicates the verified data to the first-line department A2.1 that reports to him or her, he or she never solicits input from A2.1, developing another communication void. As a result, the manager of department A2.1 has developed a very active communication system with the other first-line departments in the hope that the department's activities and concerns reach upper and middle management.

STANDARD FLOWCHART SYMBOLS

Before examining the remaining three types of flowcharts, we should define some additional symbols. The most effective flowcharts use only widely known, standard symbols. Think about how much easier it is to read a road map when you are familiar with the meaning of each symbol and what a nuisance it is to have some strange, unfamiliar shape in the area of the map you are using to make a decision about your travel plans.

The flowchart is one of the oldest of all the design aids available. For simplicity, we will review only 12 of the most common symbols, most of which are published by ANSI (see Figure 4.5).

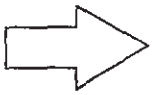
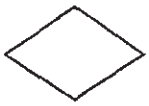
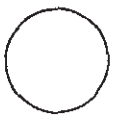
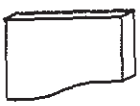
Symbol	Meaning
	*Operation: Rectangle.* Use this symbol whenever a change in an item occurs. The change may result from the expenditure of labor, a machine activity, or a combination of both. It is used to denote activity of any kind, from drilling a hole to computer data processing. It is the correct symbol to use when no other one is appropriate. Normally, you should include a short description of the activity in the rectangle.
	*Movement/transportation: Fat arrow.* Use a fat arrow to indicate movement of the output between locations (e.g., sending parts to stock, mailing a letter).
	*Decision point: Diamond.* Put a diamond at the point in the process at which a decision must be made. The next series of activities will vary based on this decision. For example, "If the letter is correct, it will be signed. If it is incorrect, it will be retyped." Typically, the outputs from the diamond are marked with the options (e.g., YES-NO, TRUE-FALSE).
	*Inspection: Big circle.* Use a big circle to signify that the process flow has stopped so that the quality of the output can be evaluated. It typically involves an inspection conducted by someone other than the person who performed the previous activity. It also can represent the point at which an approval signature is required.
	*Paper documents: Wiggle-bottomed rectangle.* Use this symbol to show when the output from an activity included information recorded on paper (e.g., written reports, letters, or computer printouts).
	*Delay: Blunted rectangle.* Use this symbol, sometimes called a bullet, when an item or person must wait, or when an item is placed in temporary storage before the next scheduled activity is performed (e.g., waiting for an airplane, waiting for a signature).

Figure 4.5 Standard flowchart symbols.

Symbol	Meaning
	*Storage: Triangle.* Use a triangle when a controlled storage condition exists and an order or requisition is required to remove the item for the next scheduled activity. This symbol is used most often to show that output is in storage waiting for a customer. The object of a continuous-flow process is to eliminate all the triangles and blunt rectangles from the process flowchart. In a business process, the triangle would be used to show the status of a purchase requisition being held by purchasing, waiting for finance to verify that the item was in the approved budget.
	*Annotation: Open rectangle.* Use an open rectangle connected to the flowchart by a dotted line to record additional information about the symbol to which it is connected. For example, in a complex flowchart plotted on many sheets of paper, this symbol could be connected to a small circle to provide the page number where the inputs will reenter the process. Another way to use an open rectangle is to identify who is responsible for performing an activity or the document that controls the activity. The open rectangle is connected to the flowchart with a dotted line so that it will not be confused with a line arrow that denotes activity flow.
	*Direction of flow: Arrow.* Use an arrow to denote the direction and order of process steps. An arrow is used for movement from one symbol to another. The arrow denotes direction—up, down, or sideways. ANSI indicates that the arrowhead is not necessary when the direction flow is from top to bottom or from left to right. However, to avoid misinterpretation by others who may not be as familiar with flowchart symbols, it is recommended that you always use arrowheads.

Figure 4.5 (Continued)

Symbol	Meaning
	*Transmission: Interrupted arrow.* Use an interrupted arrow to identify when immediate transmission of information occurs (e.g., electronic data transfer, fax, telephone call).
	*Connector: Small circle.* Use a small circle with a letter inside it at the end of a flowchart to indicate that the output from that part of the flowchart will serve as the input to another flowchart. This symbol often is used when there is not enough room to get the entire flowchart on one piece of paper. An arrowhead pointing at the small circle denotes that the circle is an output. An arrowhead facing away from the small circle denotes that it is an input. Each different output should have a different letter designation. Any output can reenter the process at a number of different points.
	*Boundaries: Elongated circle.* Use an elongated circle to show the beginning and end of the process. Normally, the word *start* or *beginning/stop* or *end* is included within the symbol.

Figure 4.5 (Continued)

The 12 symbols listed in Figure 4.5 are not meant to be a complete list of flowchart symbols, but they are the minimum you will need to adequately flowchart your business process. As you learn more about flowcharting, you can expand the number of symbols you use to cover your specific field and needs.

ANSI STANDARD FLOWCHART

An ANSI standard flowchart provides a detailed understanding of a process that greatly exceeds that of a block diagram. In fact, a block diagram often is the starting point, and a standard flowchart is used to expand the activities within each block to the desired level of detail. Each task in the process under study can be detailed to the point that the standard flowchart can be used as part of the training manual for a new employee. For most BPI activities, this type of detail is done on an exception-only basis during the improvement phase. Detailed flow-

charting is done only when the process nears world-class quality, to ensure that the improvements are not lost over time.

People follow many different processes throughout their daily lives. As an example, a person takes on a particular routine for such simple tasks as eating breakfast, taking a shower, or enjoying a Saturday morning. Most of these processes are not even thought about. Some processes involve other people to such a degree that we don't think about our own involvement. One such process might be that of getting a haircut from the friendly corner barber and/or going fishing. This process is flowcharted in Figures 4.6 and 4.7.

The standard flowchart in Figure 4.6 shows diamonds as decision symbols representing points at which different paths may be taken. Notice that the words *yes* and *no* are used to clarify alternatives. The small circles are connector symbols leading you to the second page of the chart (Figure 4.7).

A SIMPLE BUSINESS PROCESS FLOWCHART

While the flowcharts in Figures 4.6 and 4.7 are very simple, charting a business process requires careful attention. Consider the manager of a large retail store in a big city. The procedures he or she must follow can become quite complicated. He or she may have a large staff, delegate authority, supervise various departments, and so on. Each supervisor has sales reports to complete and check against inventory changes. The manager must provide each supervisor with instructions to help ease the work load and promote uniformity among the different departments. This, in turn, helps the accounting department.

A typical procedure for a supervisor might include:

1. Choosing the weekly sales total for an employee; reading the value of price items from column X and the value of sales items from column Y
2. Figuring out the X commission by multiplying the value in column X by 10 percent
3. Figuring out the Y commission by multiplying the value in column Y by 5 percent
4. Computing the total due: $50.00 + X commission + Y commission
5. Entering the total pay opposite the employee's name in the payroll ledger
6. Returning to activity 1, and repeating this for the other employees

Figure 4.8 flowcharts the procedure for calculating employees' weekly commissions. The activities in the procedure are listed beside each symbol in the flowchart to help people understand the details of the flowchart. Unfortunately, this is not usually practical on complex flowcharts.

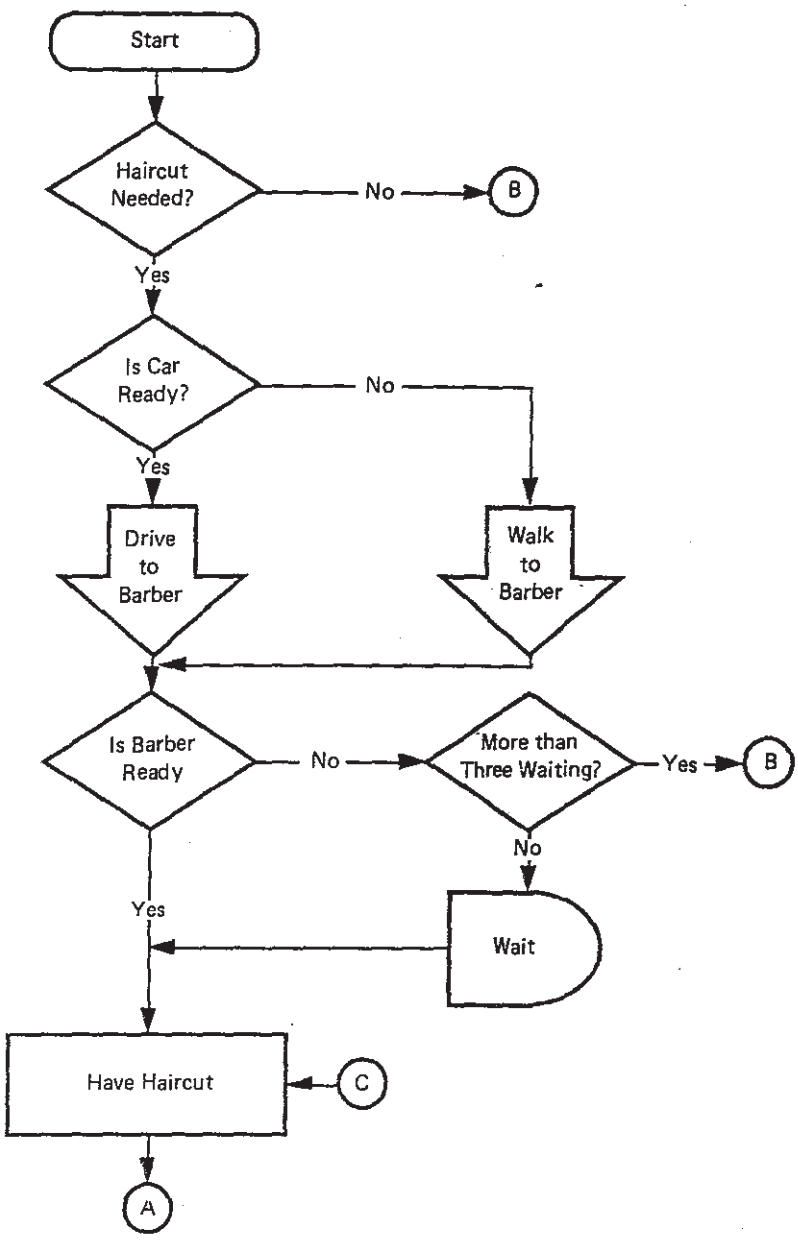


Figure 4.8 A standard flowchart of the first part of the process of getting a haircut and/or going fishing.

The first five activities in Figure 4.8 follow activities 1 through 5 of the written procedure on page 99. Notice, however, that the flowchart allows for an activity not accounted for in the written procedure (i.e., eventually, the weekly sales totals for all employees will have been processed, and the procedure need not be repeated). Flowcharting the process, in this case, helps us to discover that activity 6 should be rewritten as follows:

6. If the weekly sales totals for more employees must be calculated, go to activity 1. Otherwise, stop.

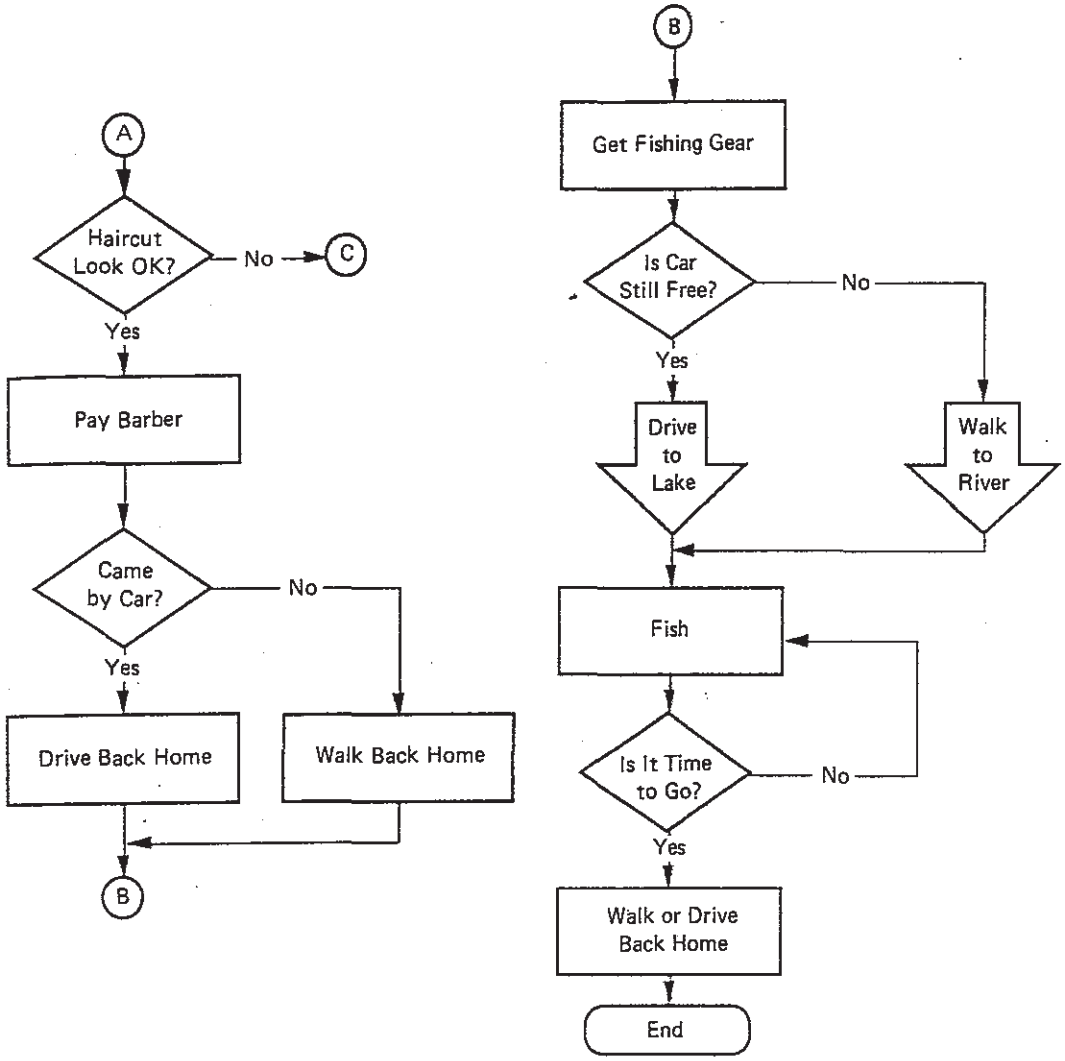


Figure 4.7 Two standard flowcharts of different parts of the process of getting a haircut and/or going fishing.

This simple flowchart clearly and accurately depicts the activities involved in the procedure and the sequence in which they are to be carried out.

FUNCTIONAL FLOWCHART

A functional flowchart is another type of flowchart. It pictures the movement between different work units, an additional dimension that is particularly valuable when total cycle time is a problem. A functional flowchart uses either block or standard flowchart symbols.

A functional flowchart identifies how vertically oriented functional departments affect a process flowing horizontally across an organization. If a process always was contained within a single department

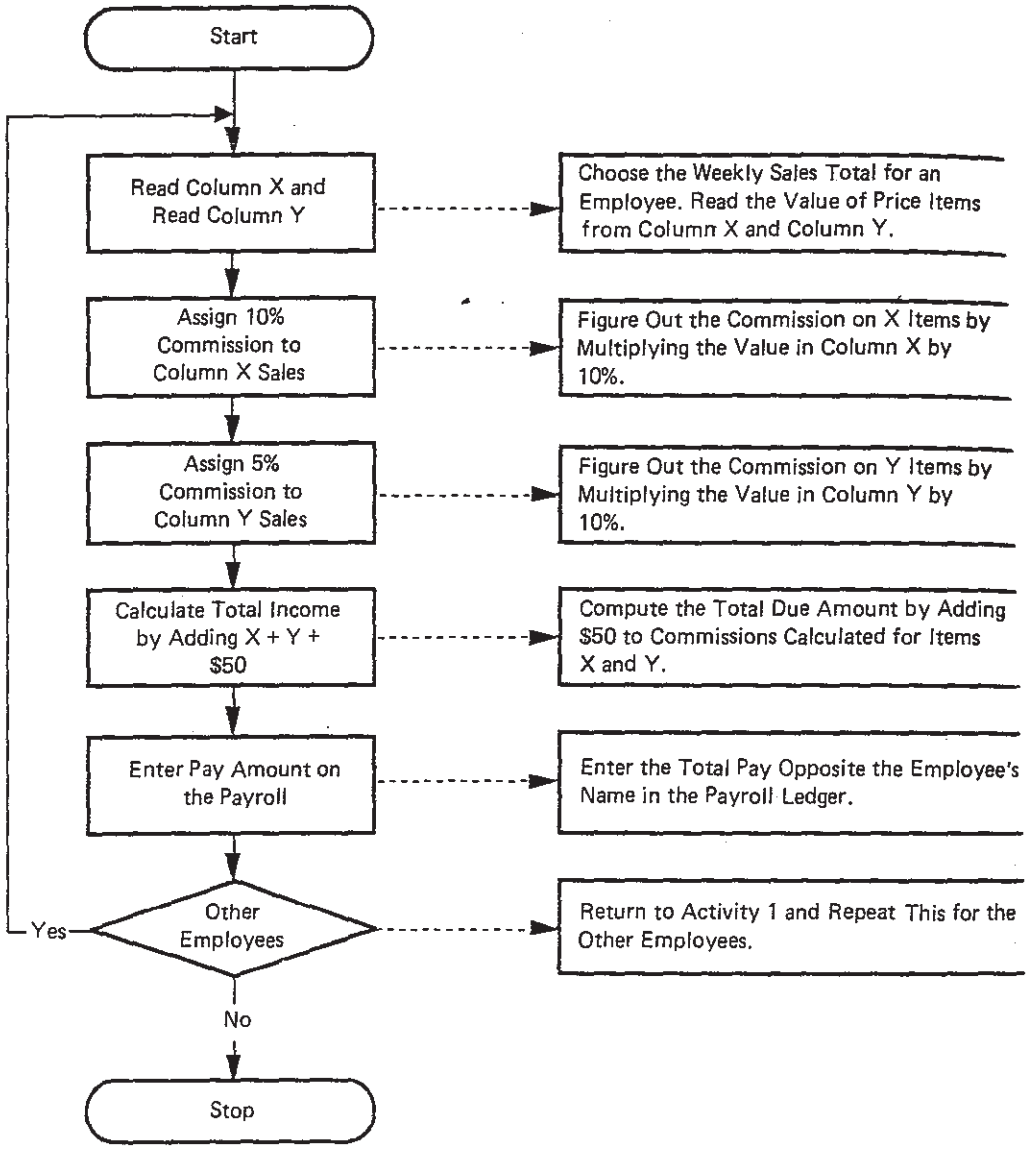


Figure 4.8 Paying commission flowchart and procedures.

and didn't cross over to other territories, a manager's life would be much easier. However, in most companies, the functional or vertical organization is a way of life, because it provides a highly trained competency center that cannot be equaled using a process or product organization.

Figure 4.9 is a standard functional flowchart of the hiring process that was block diagramed in Figure 4.1 (activities 1 through 5). To keep the flowchart simple, we have used only three of the standard symbols. We also have expanded the first 5 activities in Figure 4.1 to 15 activities and separated them by the area performing them. The 15 activities are listed on pages 103 and 104.

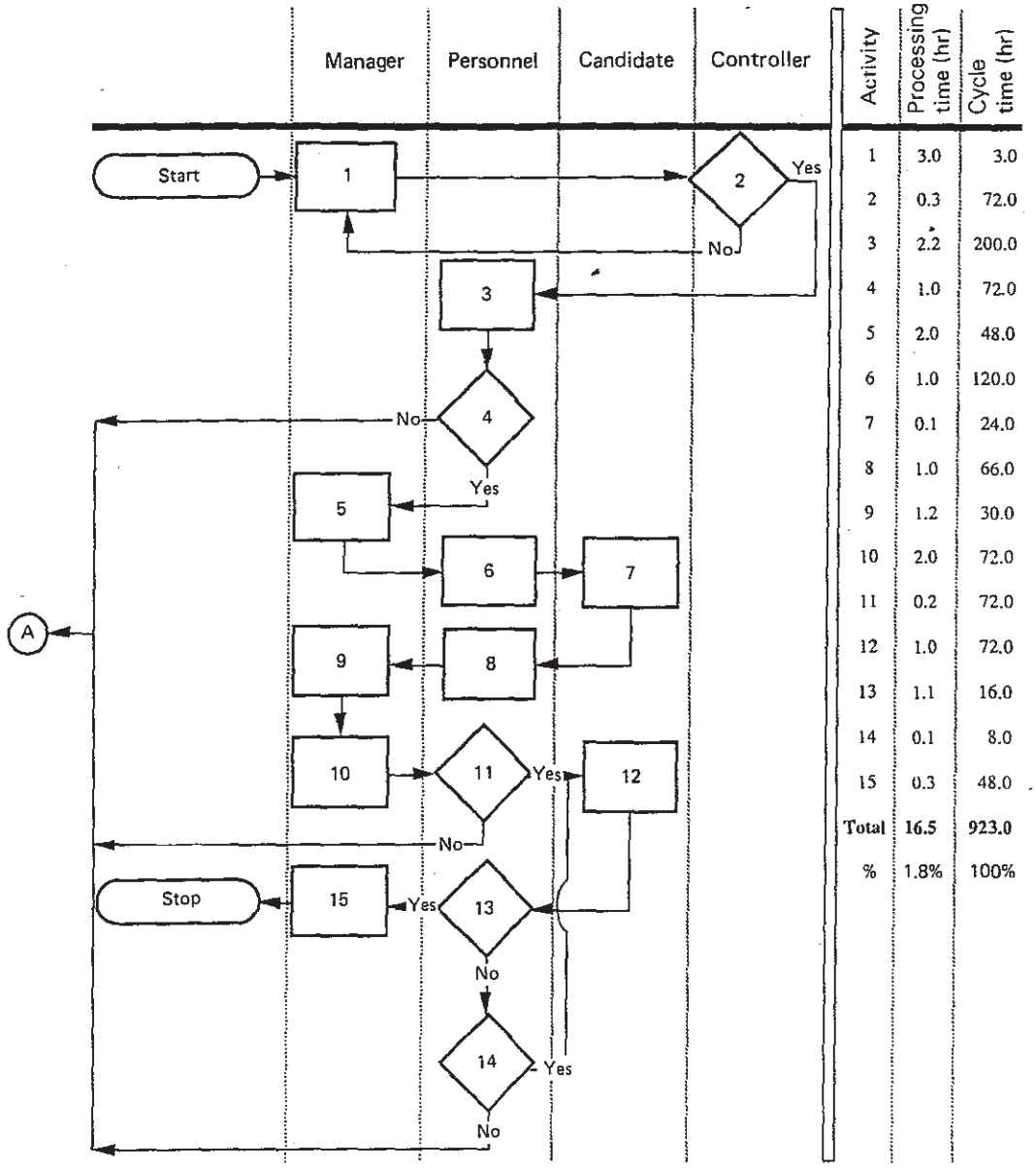


Figure 4.3 Functional flowchart of the internal job search process.

	Activity	Responsible area
1.	Recognize need. Complete payback analysis. Prepare personnel requisition. Prepare budget request.	Manager
2.	Evaluate budget. If yes, sign personnel requisition slip. If no, return total package with reject letter to manager.	Controller
3.	Conduct in-house search.	Personnel
4.	If in-house candidates exist, provide list to management. If not, start outside hiring procedure.	Personnel

	Activity	Responsible area
5.	Review candidates' paperwork and prepare a list of candidates to be interviewed.	Manager
6.	Have candidates' managers review job with the employees and determine which employees are interested in the position.	Personnel
7.	Notify personnel of candidates interested in being interviewed.	Candidates
8.	Set up meeting between manager and candidates.	Personnel
9.	Interview candidates and review details of job.	Manager
10.	Notify personnel of interview results.	Manager
11.	If acceptable candidate is available, make job offer. If not, start outside hiring process.	Personnel
12.	Evaluate job offer and notify personnel of candidate's decision.	Candidate
13.	If yes, notify manager that the job has been filled. If no, go to activity 14.	Personnel
14.	Were there other acceptable candidates? If yes, go to activity 12. If no, start outside hiring process.	Personnel
15.	Have new manager contact candidate's present manager and arrange for the candidate to report to work.	Manager

FUNCTIONAL TIME-LINE FLOWCHART

A functional time-line flowchart adds processing and cycle time to the standard functional flowchart. This flowchart offers some valuable insights when you are doing a poor-quality cost analysis to determine how much money the organization is losing because the process is not efficient and effective. Adding a time value to the already-defined functions interacting within the process makes it easy to identify areas of waste and delay.

Time is monitored in two ways. First, the time required to perform the activity is recorded in the column entitled "Processing time (hr)." The column beside it is the cycle time (i.e., the time between when the last activity was completed and the time this activity is completed). Usually, there is a major difference between the sum of the individual processing hours and the cycle time for the total process. This difference is due to waiting and transportation time.

In Figure 4.9, while the total processing time is only 16.5 hours, the total cycle time is 923.0 hours. Performing all the activities required

only 1.8 percent of the total time that it took to fill one job. The cycle time analysis shows why it takes so much time to get even the simplest job done.

One common error is to focus on reducing processing time and to ignore cycle time. The result is focusing our activities on reducing costs, without considering the business from our customers' viewpoints. Customers do not see processing time; they see only cycle time (response time). To meet our needs, we work on reducing processing time. To have happy customers, we must reduce cycle time.

In one sales process, IBM was able to reduce processing time by 30 percent, thereby reducing costs by 25 percent. At the same time, the company reduced cycle time by 75 percent. An unplanned-for side effect was a more than 300 percent increase in sales (65 percent sales closure). There is no doubt that there is a direct correlation between cycle time, customer satisfaction, and increased profits.

The time-line flow concept can be applied to all types of flowcharts. Often, elapsed time is recorded using the time that has elapsed from the time the first activity in the process started. If this method were used in Figure 4.9, the elapsed time recorded adjacent to activity 3 would be the sum of the time recorded for activities 1, 2, and 3, or 275 hours.

GEOGRAPHIC FLOWCHART

A geographic or physical layout flowchart analyzes the physical flow of activities. It helps to minimize the time wasted while work output and/or resources are moved between activities. Figure 4.10 presents a geographic flowchart of how a new employee spends his or her first day at the HJH Company. It starts with a geographic layout of the buildings at HJH headquarters. Laid over the geographic layout, using broken lines, is the movement of the new employee on his or her first day. To help you understand how to use this chart, we will follow the new employee through the first day:

1. New employee signs in at lobby and asks receptionist to call personnel.
2. Personnel placement representative greets new employee and takes him or her to personnel department to review pertinent procedures.
3. Placement representative takes new employee to medical department to fill out medical forms and make appointment with nurse for required tests.

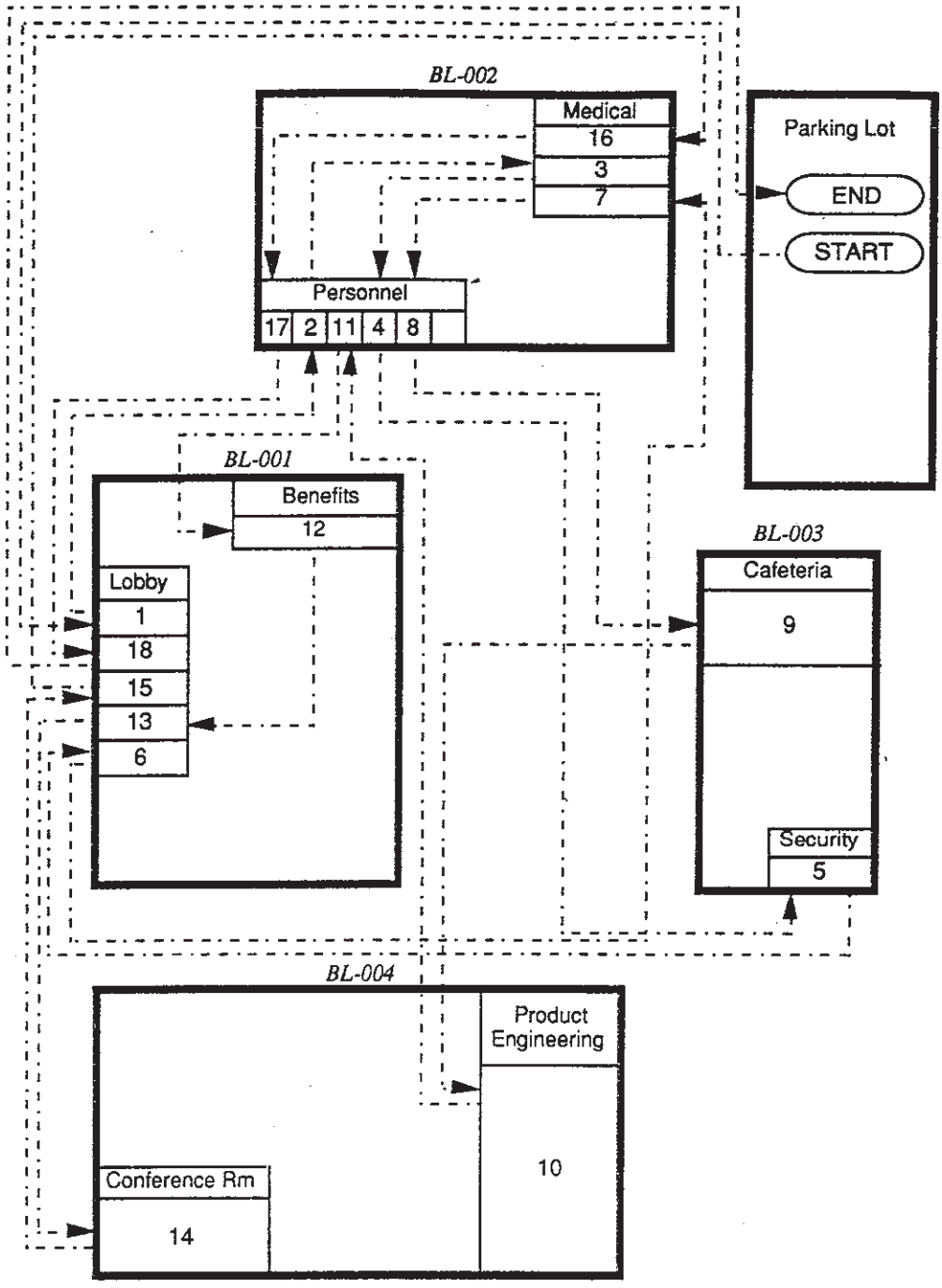


Figure 4.10 Geographic flowchart of a new employee's first day at HJH Company.

4. New employee returns to personnel department to fill out payroll forms.

5. New employee and the placement representative go to security for pictures and temporary identification badge.

6. New employee returns to lobby to wait for appointment with nurse. He or she can go unescorted now that he or she has a temporary badge.

7. New employee goes to medical for blood tests and makes appointment for physical exam with doctor.
8. New employee returns to personnel department per instructions.
9. Placement representative takes new employee to lunch.
10. Placement representative takes new employee to meet his or her new manager and tour the department.
11. New employee goes to personnel so that personnel can take him or her to benefits.
12. New employee reviews benefits package and selects benefit plan.
13. New employee goes to lobby to wait for the new employee orientation meeting.
14. New employee attends new employee orientation meeting.
15. New employee returns to lobby to wait for appointment with doctor.
16. New employee goes to medical for appointment with doctor and returns to personnel.
17. Personnel reviews new employee checklist and calls medical to find out whetner exam results are favorable.
18. New employee returns to lobby, turns in temporary badge, and signs out.

First impressions are key. How do you think new employees feel about this company after a day of "hurry up and wait"? Probably, they are questioning whether they made the right decisions in joining the company. Analyzing this flowchart quickly reveals wasted motion and time. For example, if new employees reported to a special waiting room in personnel, the amount of time the employees and the personnel placement representative expended during the day would be greatly reduced. If personnel gave out the temporary badges, personnel would not have to escort the employees to other departments.

Let's think about what can be done to refine the flow and make better use of the new employees' and the personnel placement representative's time.

1. Should the physical be conducted before the employee reports to work? Isn't it part of the search process, not the indoctrination process? If the new employee had left another job to join your firm and then failed the physical, what is your company's obligation to that person? How much would it slow down the process to get a new employee on board? Obviously, the physical should have been conducted before the new employee's first day.
2. Have the employee report first to a small waiting room in personnel. At that time, the personnel placement representative can provide a temporary badge.
3. From personnel, the new employee should go directly to benefits.

4. The employee indoctrination meeting should be held right after the meeting with the benefits department.
5. The new employee's manager should meet him or her at the end of the indoctrination meeting and proceed to security. A picture of the new employee should be taken for the permanent security badge.
6. The manager then should take the new employee to lunch.
7. The manager should escort the new employee to the work area and proceed with job training.
8. The new employee should keep the temporary badge until a permanent badge is available. This allows the employee to go home directly from work. When the employee's permanent badge is available, the manager should mail the temporary badge back to personnel.

Figure 4.11 shows the new geographic flowchart. In addition to simplifying the work flow, the new employee is now in his or her work area for the second half of the day. The result is a more efficient process that leaves the new employee with a much better impression of the company.

Geographic flowcharting is a useful tool for evaluating department layout and paperwork flow, and for analyzing product flow, by identifying excessive travel and storage delays. In business processes, geographic flowcharting helps in analyzing traffic patterns around busy areas like file cabinets, computers, and copiers.

TAKING AN INFORMATION-PROCESSING VIEW

In addition to the four basic flowcharts we have covered already (block diagrams, ANSI standard flowcharts, functional flowcharts, and geographic flowcharts), there are information diagrams, often with their own set of symbols. As a rule, these are of more interest to computer programmers and automated systems analysts than to managers and employees charting business activities. The two books listed at the end of this chapter discuss some of these tools.

You can consider these types of flowcharts as diagrams that follow information through a process. As you prepare flowcharts, think of your organizational activities in terms of information processing. Begin with your organization's files. They are valuable because they contain information that is changed or used by your business processes.

Next, consider your employees. You and your coworkers have skills of various levels and types. Obviously, even a single worker's knowledge is substantially more sophisticated than the information in a file. But the principle still holds: An employee's value to an organization depends on

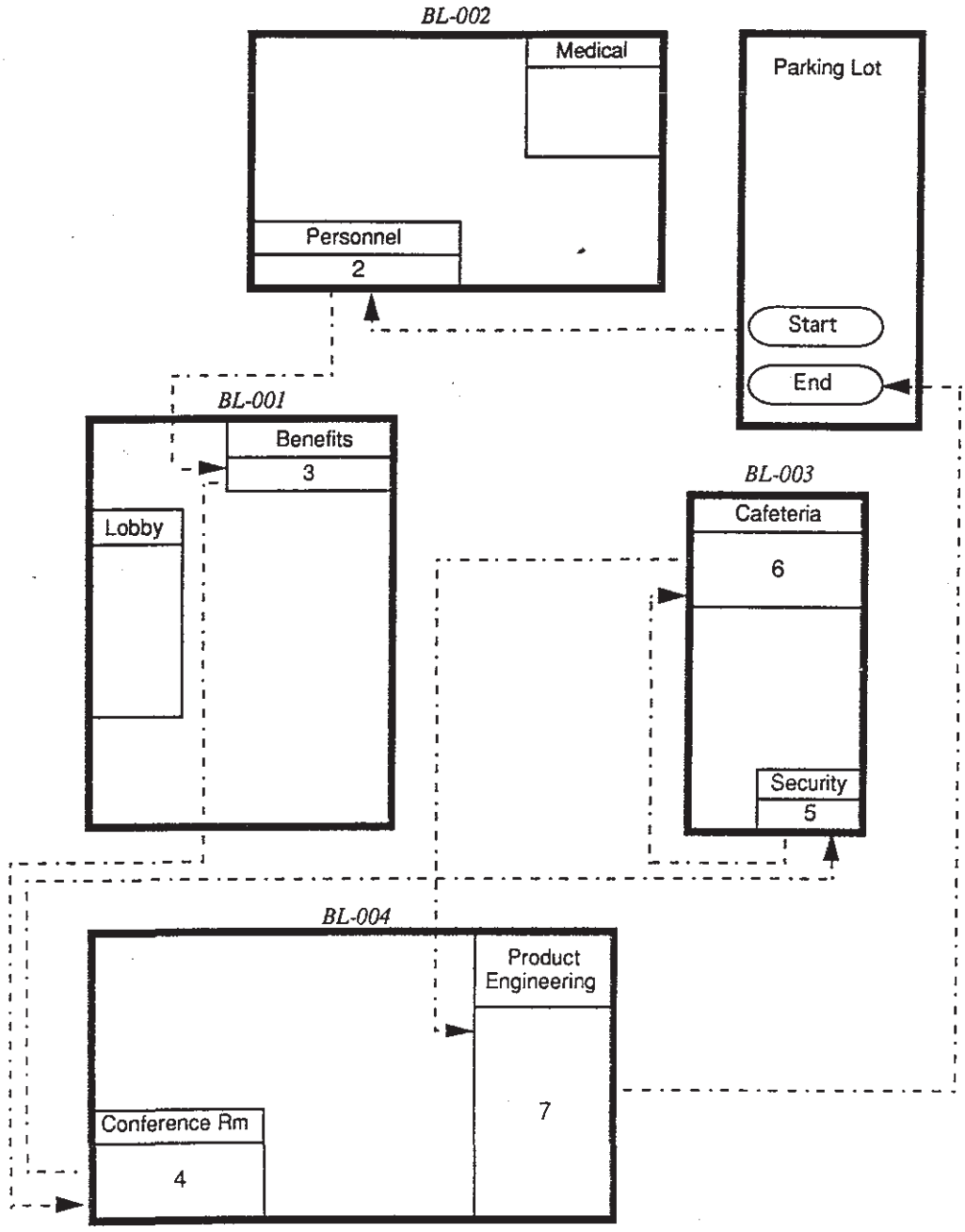


Figure 4.11 Revised geographic flowchart of a new employee's first day at HJH Company.

his or her contributions of information. Whether it's how to load a pallet, introduce a new product, or resolve a conflict, information is a resource. This is particularly true in the service industries which, in 1989, employed more than 70 percent of workers in the United States. All of them can be considered information processors and providers.

Taking an information-processing view when preparing your flowcharts will create a common focus on getting and using quality input in

order to produce quality output. At the same time, an information-processing view helps people decide how to draw flowcharts and which elements to include. More specifically, you should:

1. Feature the parts of the process for which information validity and reliability are most important.
2. Consider the three different information-processing dimensions of business processes: what information is processed, what activities are involved in processing the information, and which elements control other elements. If your flowchart doesn't have the impact you want, try drawing it to feature one of the other dimensions.
3. Remember that organizations consist of people, and whenever people are involved, information transmission and processing are complicated. Consequently, it is better to draw several easily understandable flowcharts than one comprehensive, but incomprehensible, master chart.

DATA DICTIONARY

Many of you may never need to use a data dictionary because your flowcharts will be reasonably uncomplicated and straightforward. There will be some of you, though, who will need to go into considerable detail covering a broad range of activities. In this case, the use of a data dictionary becomes necessary in order to be sure that all labels and definitions are clear and understood.

The most effective flowcharts use words and phrases that people will easily understand, and they include only widely known, standard symbols. Often, an accompanying glossary of terms, known as a *data dictionary* by information-processing professionals, helps. Each entry in the dictionary refers to a label used in the flowcharts.

A data dictionary serves a number of reference purposes. For example, it alerts you to database homonyms. A *database* is a collection of information inside an organization's files. (Often these files are computerized.) Homonyms exist when the same label refers to different items. Consider, for example, the label "Enter employee ID." On one flowchart, this might mean, "Record the employee's social security number on a form." On another flowchart it might mean, "Type the employee's name into a computer system and wait for the system to verify the entry." Because of their multiple meanings, database homonyms can cause confusion in a set of flowcharts.

Homonyms occur because flowchart labels must be brief. You don't have space for a detailed explanation on the chart itself, but you can include the definition in the data dictionary. Checking the dictionary

before selecting a label will tell you whether there are other ways in which your label is being used already. If this is so, you might select another label or take special measures to ensure that people using your flowchart know what you really mean.

You also can use the data dictionary for assistance with database synonyms—when different labels have identical definitions. For example, *receivables* might refer to the same thing as *sales collectible.*

As with homonyms, database synonyms may be necessary. People prefer to use familiar terms when constructing their flowcharts, and employees in different parts of the organization may have different words for an identical item. Recognizing the value of familiarity, information-processing professionals call database synonyms that are acceptable *aliases.*

Yet synonyms must be identified. Otherwise, a team drawing an overview flowchart with activities from the accounting department and the sales department might include unnecessary duplication. That's where developing a data dictionary can help. When the accounting department is asked to define the receivables file, and the sales department is asked to define the sales collectible file, the team creating the flowchart will discover that the two files are the same.

In addition, a data dictionary can include detailed information, beyond a definition, about the activity represented on the flowchart. In searching for ways to improve business activities, a team may be interested in how many records a certain file contains or how many items are processed each week through a certain activity. The team also may want to know on which flowcharts a given label appears to accurately evaluate the implications of a change. All these details can be stored in the data dictionary.

Data dictionaries can be maintained manually or on a computer system. With a computer system, you can more easily revise, arrange, and locate information. If you create your flowcharts with a computer, automating the data dictionary has even further advantages, since you can develop a system of automated cross-references between the charts and the dictionary.

SUMMARY

Flowcharting is a key tool for understanding business processes. Laying out a process on a piece of paper in an easily understandable format often sets the stage for major process improvement. It is also an effective tool for analyzing the impact of proposed changes. Many business process flowcharts become very complex, often covering an entire wall, but the understanding the PIT gains from this type of analysis is well

worth the effort. In the case of new processes, flowcharts should precede the preparation of the procedures.

To improve the quality of their products and services, many businesspeople have used flowcharting techniques with enviable results. Others, however, have been less successful. Generally, this happens because they view their flowcharts as the end of, rather than the means to, what they are seeking. It is an easy mistake to make. Compared to some techniques for improving quality and productivity, flowcharting is easy to understand and use. Furthermore, in their enthusiasm for improvement, some people are tempted to flowchart in detail every process they can find. Fortunately, however, such diligence is rarely necessary.

Flowcharts serve one main purpose: to document a process in order to identify areas in need of improvement. The "magic" doesn't come from documenting the process but from analyzing it—and that is where you should focus most of your efforts. Remember, the purpose of flowcharting and the following analysis is to gain enough knowledge to define and implement process improvements. It should not become an end unto itself.

Flowcharts are tools. It is in the BPI activities following flowcharting that their full value is realized. However, the flowcharting process itself prepares people for the productive changes ahead:

1. Those who participate in creating the flowcharts recognize their own competence and influence. They now know how their contributions serve to empower their coworkers. They are proud that their role is documented on a diagram that others will consult.
2. People see that the value of their performance affects how others use the output. This stimulates curiosity about customers' expectations and strengthens ties between employees and customers.
3. In creating flowcharts, people gain understanding of each other's jobs, resulting in increased cooperation in the work environment. Building flowcharts builds teamwork.
4. As the flowchart grows, participants are inspired by the available sources of assistance and support. The message of the flowchart is that there are power and companionship in the organization.
5. At the same time, individual accountability blooms. The flowchart triggers improvement efforts, adherence to standards of quality, and commitment to reduce process variations.
6. Objective setting is facilitated, even in those parts of the organization that have resisted performance measurement or where people have argued about what are legitimate, realistic objectives.

Throughout all of this, flowcharts focus attention on opportunities for change. As BPIs occur, your team will recognize where the charts are no longer accurate and where revisions are necessary. In addition, you'll

create new versions of flowcharts as you and your coworkers become more skilled at constructing them. Some of this is growth in technical and artistic talents. But a much more important part is developing conceptual talents. The people in your organization will begin to view business activities more systematically and more creatively. As you build flowcharts, and check their accuracy, you'll become more sensitive to ways in which you can make your business better.

ADDITIONAL READING

Jeffrey, D. R., and M. J. Lawrence, *Systems Analysis and Design*, Prentice Hall, Englewood Cliffs, NJ, 1984.

Modell, M. E., *A Professional's Guide to Systems Analysis*, McGraw-Hill, New York, 1988.