CHAPTER 4

Information Gathering: Interactive Methods

LEARNING OBJECTIVES

Once you have mastered the material in this chapter you will be able to:

1. Recognize the value of interactive methods for information gathering.
2. Construct interview questions to elicit human information requirements.
3. Structure interviews in a way that is meaningful to users.
4. Understand the concept of JAD and when to use it.
5. Write effective questions to survey users about their work.
6. Design and administer effective questionnaires.

There are three key interactive methods that you can use to elicit human information requirements from organizational members. These three methods are interviewing, joint application design (JAD), and surveying people through questionnaires. Although different in their implementation, these methods have a great deal in common, too. The basis of their shared properties is talking with and listening to people in the organization to understand their interactions with technology through a series of carefully composed questions.

Each of the three interactive methods for information gathering possesses its own established process for you to follow in interacting with users. If followed, these systematic approaches will help ensure proper design and implementation of interviews, JAD workshops, and questionnaires, as well as support insightful analysis of the resulting data. Unobtrusive methods (sampling, investigation, and observing a decision maker's behavior and physical environment) that do not require the same degree of interactivity between analysts and users will be covered in an upcoming chapter. By using interactive methods with unobtrusive methods you will achieve a more complete portrait of the organization's information requirements.

INTERVIEWING

Before you interview someone else, you must in effect interview yourself. You need to know your biases and how they will affect your perceptions. Your education, intellect, upbringing, emotions, and ethical framework all serve as powerful filters for what you will be hearing in your interviews.

You need to think through the interview thoroughly before you go. Visualize why you are going, what you will ask, and what will make it a successful interview in your eyes. You must anticipate how to make the interview fulfilling for the individual you interview, as well.

An information-gathering interview is a directed conversation with a specific purpose that uses a question-and-answer format. In the interview you want to get the opinions of the interviewee and his or her feelings about the current state of the system, organizational and personal goals, and informal procedures for interacting with information technologies.

Above all, seek the opinions of the person you are interviewing. Opinions may be more important and more revealing than facts. For example, imagine asking the owner of a traditional store who has recently added an online store how many customer refunds she typically gives for Web transactions each week. She replies, "About 20 to 25 a week." When you monitor the transactions and discover that the average is only 10.5 per week, you might conclude that the owner is overstating the facts and the problem.

Imagine instead that you ask the owner what her major concerns are and that she replies, "In my opinion, customer returns of goods purchased over the Web are way too high." By seeking opinions rather than facts, you discover a key problem that the owner wants addressed.

In addition to opinions, you should try to capture the feelings of the interviewee. Remember that the interviewee knows the organization better than you do. You can understand the organization's culture more fully by listening to the feelings of the respondent.

Goals are important information that can be gleaned from interviewing. Facts that you obtain from hard data may explain past performance, but goals project the organization's future. Try to find out as many of the organization's goals as possible from interviewing. You may not be able to determine goals through any other data-gathering methods.

The interview is also a valuable time to explore key HCI (human–computer interaction) concerns, including the ergonomic aspects, the system usability, how pleasing and enjoyable the system is, and how useful it is in supporting individual tasks.

In the interview you are setting up a relationship with someone who is probably a stranger to you. You need to build trust and understanding quickly, but at the same time you must maintain control of the interview. You also need to sell the system by providing needed information to your interviewee. Do so by planning for the interview before you go so that conducting it is second nature to you. Fortunately, effective interviewing can be learned. As you practice, you will see yourself improving. Later in the chapter we discuss joint application design (JAD) (pronounced as one word, jăd, rhymes with add), which can serve as an alternative to one-on-one interviewing in certain situations.

Five Steps in Interview Preparation

The five major steps in interview preparation are shown in Figure 4.1. These steps include a range of activities from gathering basic background material to deciding who to interview.

READ BACKGROUND MATERIAL. Read and understand as much background information about the interviewees and their organization as possible. This material can often be obtained on the corporate Web site, from a current annual report, a corporate newsletter, or any publications sent out to explain the organization to the public. Check the Internet for any corporate information such as that in Standard and Poor's.

As you read through this material, be particularly sensitive to the language the organizational members use in describing themselves and their organization. What you are trying to do is build up a common vocabulary that will eventually enable you to phrase interview questions in a way that is understandable to your interviewee. Another benefit of researching your organization is to maximize the time you spend in interviews; without such preparation you may waste time asking general background questions.

ESTABLISH INTERVIEWING OBJECTIVES. Use the background information you gathered as well as your own experience to establish interview objectives. There should be four to six key areas concerning HCI, information processing, and decision-making behavior about which you will want to ask questions. These areas include HCI concerns (the usefulness and usability of the system; how it fits physical aspects; how it suits a user's cognitive capabilities, whether it is engaging or aesthetically pleasing; and whether using the system is rewarded with desired consequences), information sources, information formats, decision-making frequency, qualities of information, and decision-making style.

DECIDE WHOM TO INTERVIEW. When deciding whom to interview, include key people at all levels who will be affected by the system in some manner. Strive for balance so that as many users' needs are addressed as possible. Your organizational contact will also have some ideas about whom should be interviewed.

PREPARE THE INTERVIEWEE. Prepare the person to be interviewed by calling ahead or sending an email message and allowing the interviewee time to think about the interview. If you are doing an in-depth interview, it is permissible to email your questions ahead of time to allow your interviewee time to think over his or her responses. Because there are many objectives to fulfill in the interview (including building trust and observing the workplace), however, interviews should typically be conducted in person and not via email. Interviews should be kept to 45 minutes or an hour at the most. No matter how much your interviewees seem to want to extend the interview beyond this limit, remember that when they spend time with you, they are not doing their work. If interviews go over an hour, it is likely that the interviewees will resent the intrusion, whether or not they articulate their resentment.

DECIDE ON QUESTION TYPES AND STRUCTURE. Write questions to cover the key areas of HCI and decision making that you discovered when you ascertained interview objectives. Proper questioning techniques are the heart of interviewing. Questions have some basic forms you need to know. The two basic question types are open-ended and closed. Each question type can accomplish something a little different from the other, and each has benefits and drawbacks. You need to think about the effect each question type will have.

It is possible to structure your interview in three different patterns: a pyramid structure, a funnel structure, or a diamond structure. Each is appropriate under different conditions and serves a different function, and each one is discussed later in this chapter.

Question Types

OPEN-ENDED QUESTIONS. Open-ended questions include those such as "What do you think about putting all the managers on an intranet?" "Please explain how you make a scheduling decision." "In what ways does the system extend your capability to do tasks that would not be possible otherwise?" Consider the term *open-ended*. "Open" actually describes the interviewee's options for responding. They are open. The response can be two words or two paragraphs. Some examples of open-ended questions are found in Figure 4.2.

The benefits of using open-ended questions are numerous and include the following:

1. Putting the interviewee at ease.
2. Allowing the interviewer to pick up on the interviewee's vocabulary, which reflects his or her education, values, attitudes, and beliefs.
3. Providing richness of detail.
4. Revealing avenues of further questioning that may have gone untapped.
5. Making it more interesting for the interviewee.
6. Allowing more spontaneity.

Steps in Planning the Interview

1. Read background material.
2. Establish interviewing objectives.
3. Decide whom to interview.
4. Prepare the interviewee.
5. Decide on question types and structure.

FIGURE 4.1
Steps the systems analyst follows in planning the interview.

Open-Ended Interview Questions

- What's your opinion of the current state of business-to-business ecommerce in your firm?
- What are the critical objectives of your department?
- Once the data are submitted via the Web site, how are they processed?
- Describe the monitoring process that is available online.
- What are some of the common data entry errors made in this department?
- What are the biggest frustrations you've experienced during the transition to ecommerce?

FIGURE 4.2
Open-ended interview questions allow the respondent open options for responding. The examples were selected from different interviews and are not shown in any particular order.

FIGURE 4.3
Closed interview questions limit the respondent's options. The examples were selected from different interviews and are not shown in any particular order.

Closed Interview Questions

- How many times a week is the project repository updated?
- On average, how many calls does the call center receive monthly?
- Which of the following sources of information is most valuable to you?
  - Completed customer complaint forms
  - Email complaints from consumers who visit the Web site
  - Face-to-face interaction with customers
  - Returned merchandise
- List your top two priorities for improving the technology infrastructure.
- Who receives this input?

7. Making phrasing easier for the interviewer.
8. Using them in a pinch if the interviewer is caught unprepared.

As you can see, there are several advantages to using open-ended questions. There are, however, also many drawbacks:

1. Asking questions that may result in too much irrelevant detail.
2. Possibly losing control of the interview.
3. Allowing responses that may take too much time for the amount of useful information gained.
4. Potentially seeming that the interviewer is unprepared.
5. Possibly giving the impression that the interviewer is on a "fishing expedition" with no real objective for the interview.

You must carefully consider the implications of using open-ended questions for interviewing.

CLOSED QUESTIONS. The alternative to open-ended questions is found in the other basic question type: closed questions. Such questions are of the basic form "Is it easy to use the current system?" and, "How many subordinates do you have?" The possible responses are closed to the interviewee, because he or she can only reply with a finite number such as "None," "One," or "Fifteen." Some examples of closed questions can be found in Figure 4.3.

A closed question limits the response available to the interviewee. You may be familiar with closed questions through multiple-choice exams in college. You are given a question and five responses, but you are not allowed to write down your own response and still be counted as having correctly answered the question.

A special kind of closed question is the bipolar question. This type of question limits the interviewee even further by only allowing a choice on either pole, such as yes or no, true or false, agree or disagree. Examples of bipolar questions can be found in Figure 4.4.

The benefits of using closed questions of either type include the following:

1. Saving time.
2. Easily comparing interviews.
3. Getting to the point.
4. Keeping control over the interview.
5. Covering lots of ground quickly.
6. Getting to relevant data.

FIGURE 4.4
Bipolar interview questions are a special kind of closed question. The examples were selected from different interviews and are not shown in any particular order.

Bipolar Interview Questions

- Do you use the Web to provide information to vendors?
- Do you agree or disagree that ecommerce on the Web lacks security?
- Do you want to receive a printout of your account status every month?
- Does your Web site maintain a FAQ page for employees with payroll questions?
- Is this form complete?

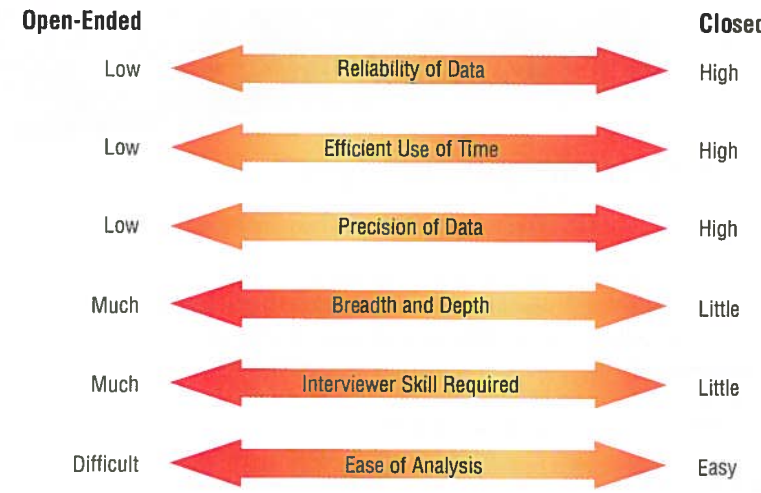


FIGURE 4.5
Attributes of open-ended and closed questions.

The drawbacks of using closed questions are substantial, however. They include the following:

1. Being boring for the interviewee.
2. Failing to obtain rich detail (because the interviewer supplies the frame of reference for the interviewee).
3. Missing main ideas for the preceding reason.
4. Failing to build rapport between interviewer and interviewee.

Thus, as the interviewer, you must think carefully about the question types you will use.

Both open-ended and closed questions have advantages and drawbacks, as shown in Figure 4.5. Notice that choosing one question type over the other actually involves a trade-off; although an open-ended question affords breadth and depth of reply, responses to open-ended questions are difficult to analyze.

PROBES. A third type of question is the probe or follow-up. The strongest probe is the simplest: the question, "Why?" Other probes are "Can you give me an example of a time you did not find the system trustworthy?" and "Will you elaborate on that for me?" Some examples of probing questions can be found in Figure 4.6. The purpose of the probe is to go beyond the initial answer to get more meaning, to clarify, and to draw out and expand on the interviewee's point. Probes may be either open-ended or closed questions.

It is essential to probe. Most beginning interviewers are reticent about probing and consequently accept superficial answers. They are usually grateful that employees have granted interviews and feel somewhat obligated to accept unqualified statements politely.

Arranging Questions in a Logical Sequence

Just as there are two generally recognized ways of reasoning—inductive and deductive—there are two similar ways of organizing your interviews. A third way combines both inductive and deductive patterns.

Probes

- Why?
- Give an example of how ecommerce has been integrated into your business processes.
- Please give an illustration of the security problems you are experiencing with your online bill payment system.
- You mentioned both an intranet and an extranet solution. Please give an example of how you think each differs.
- What makes you feel that way?
- Tell me step by step what happens after a customer clicks the "Submit" button on the Web registration form.

FIGURE 4.6
Probes allow the systems analyst to follow up on questions to get more detailed responses. The examples were selected from different interviews and are not shown in any particular order.

CONSULTING OPPORTUNITY 4.1

Strengthening Your Question Types

Strongbodies, a large, local chain of sports clubs, has experienced phenomenal growth in the past five years. Management would like to refine its decision-making process for purchasing new bodybuilding equipment. Currently, managers listen to customers, attend trade shows, look at advertisements, and put in requests for new equipment purchases based on their subjective perceptions. These are then approved or denied by Harry Mussels.

Harry is the first person you will interview. He is a 37-year-old division manager who runs five area clubs. He travels all over the city to their widespread locations. He keeps an office at the East location, although he is there less than a quarter of the time.

In addition, when Harry is present at a club, he is busy answering business-related phone calls, solving on-the-spot problems presented by managers, and interacting with club members. His time is short, and to compensate for that he has become an extremely well-organized, efficient divisional manager. He cannot grant you a lot of interview time. However, his input is important, and he feels he would be the main beneficiary of the proposed system.

What type of interview question might be most suitable for your interview with Harry? Why is this type most appropriate? How will your choice of question type affect the amount of time you spend in preparation for interviewing Harry? Write 5 to 10 questions of this type. What other techniques might you use to supplement information unavailable through that type of question? Write a paragraph to explain.

USING A PYRAMID STRUCTURE. Inductive organization of interview questions can be visualized as having a pyramid shape. Using this form, the interviewer begins with very detailed, often closed, questions. The interviewer then expands the topics by allowing open-ended questions and more generalized responses, as shown in Figure 4.7.

A pyramid structure should be used if you believe your interviewee needs to warm up to the topic. Using a pyramid structure for question sequencing is also useful when you want an ending

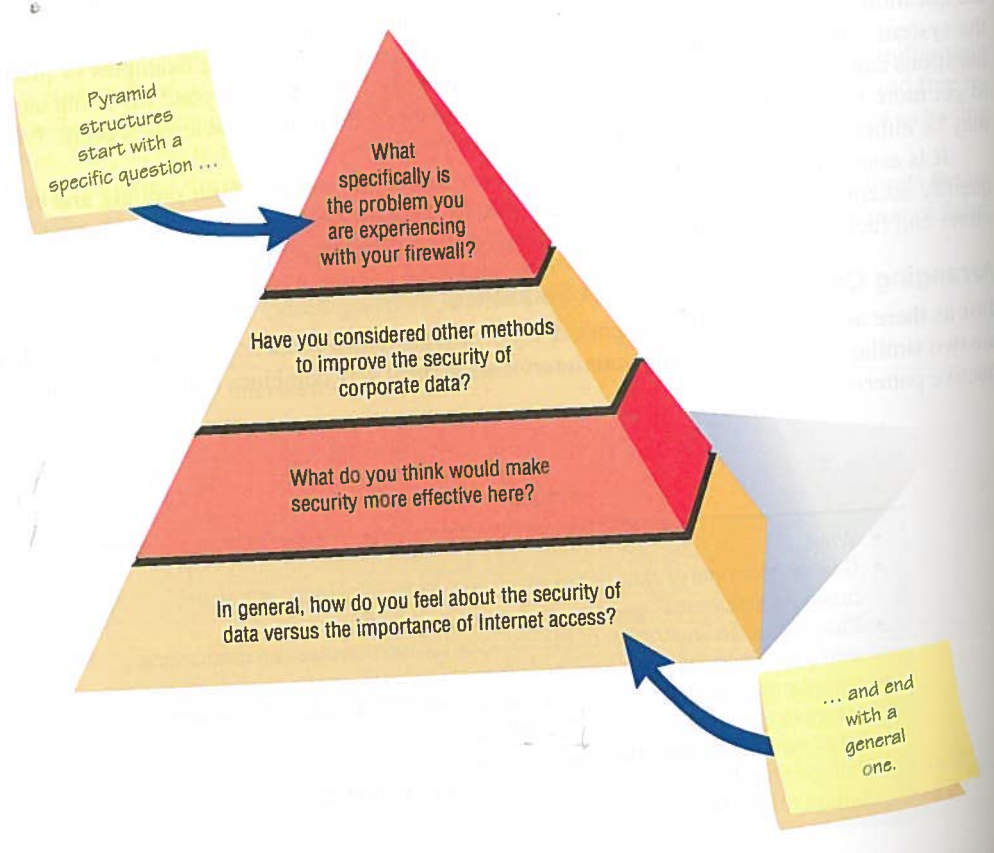


FIGURE 4.7
Pyramid structure for interviewing goes from specific to general questions.

determination about the topic. Such is the case in the final question, "In general, how do you feel about the security of data versus the importance of Internet access?"

USING A FUNNEL STRUCTURE. In the second kind of structure, the interviewer takes a deductive approach by beginning with generalized, open-ended questions and then narrowing the possible responses by using closed questions. This interview structure can be thought of as funnel shaped, as that depicted in Figure 4.8. Using the funnel structure method provides an easy, nonthreatening way to begin an interview. A funnel-shaped question sequence is also useful when the interviewee feels emotional about the topic and needs freedom to express those emotions.

USING A DIAMOND-SHAPED STRUCTURE. Often a combination of the two structures, resulting in a diamond-shaped interview structure, is best. This structure entails beginning in a very specific way, then examining general issues, and finally coming to a very specific conclusion, as shown in Figure 4.9.

The interviewer begins with easy, closed questions that provide a warm-up to the interview process. In the middle of the interview, the interviewee is asked for opinions on broad topics that obviously have no "right" answer. The interviewer then narrows the questions again to get specific questions answered, thus providing closure for both the interviewee and the interviewer. The diamond structure combines the strengths of the other two approaches but has the disadvantage of taking longer than either other structure.

The end of the interview is a natural place to ask one key question: "Is there anything we haven't touched on that you feel is important for me to know?" Considered a formula question by the interviewee most of the time, the response will often be "No." You are interested in the other times, when this question opens the proverbial floodgates and much new data are presented, though.

As you conclude the interview, summarize and provide feedback on your overall impressions. Inform the interviewee about the subsequent steps to take and what you and other team members will do next. Ask the interviewee with whom you should talk next. Set up future appointment times for follow-up interviews, thank the interviewee for his or her time, and shake hands.

Writing the Interview Report

Although the interview itself is complete, your work on the interview data is just beginning. You need to capture the essence of the interview through a written report. It is imperative that you write the interview report as soon as possible after the interview. This step is another way you can ensure quality of interview data. The longer you wait to write up your interview, the more suspect the quality of your data becomes.

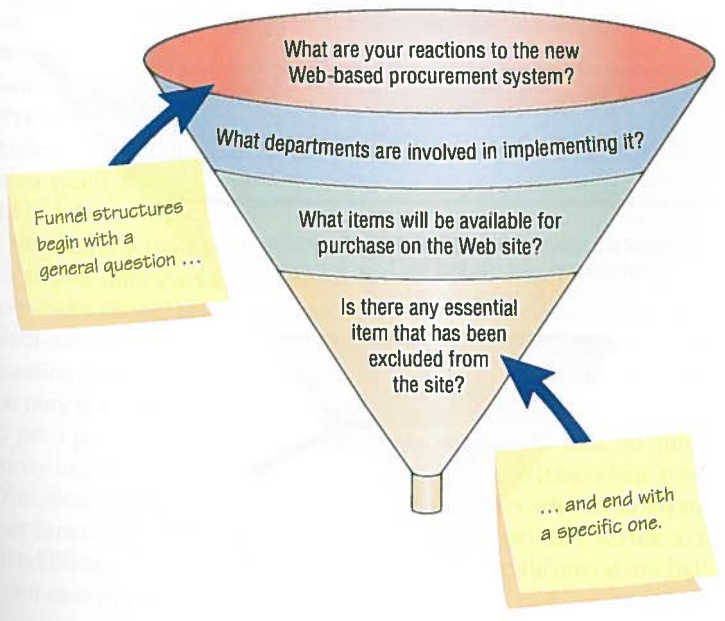


FIGURE 4.8
Funnel structure for interviewing begins with broad questions, then funnels to specific questions.

CONSULTING OPPORTUNITY 4.2

Skimming the Surface

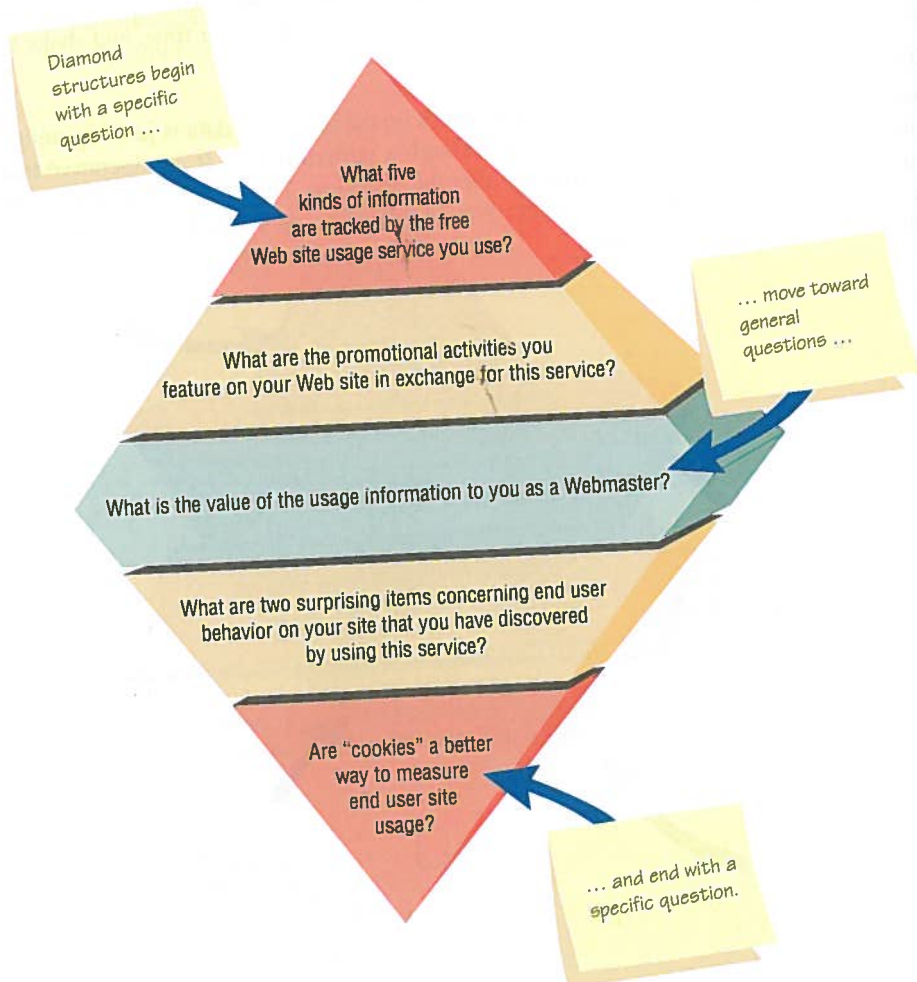
You are about to leave SureCheck Dairy after a preliminary tour when another member of your systems analysis team calls you at the dairy to say he cannot make his interview appointment with the plant manager because of illness. The plant manager is extremely busy, and you want to keep his enthusiasm for the project going by doing things as scheduled. You also realize that without the initial interview data, the rest of your data gathering will be slowed. Although you have no interview questions prepared, you make the decision to go ahead and interview the plant manager on the spot.

You have learned that SureCheck is interested in processing its own data on quantities and kinds of dairy products sold so that its people can use that information to better control production of the company's large product line (it includes whole, skim, 2 percent, and 1 percent milk, half-and-half, cottage cheese, yogurt, and frozen novelties). Sales managers are currently sending their sales figures to corporate headquarters, 600 miles away, and processing turnaround seems slow. You will base your ad-libbed questions on what you have just found out on the tour.

In the few minutes before your interview begins, decide on a structure for it: funnel, pyramid, or diamond. In a paragraph, justify why you would proceed with the interview structure you have chosen based on the unusual context of this interview. Write a series of questions and organize them in the structure you have chosen.

After this initial summary, go into more detail, noting main points of the interview and your own opinions. Review the interview report with the respondent at a follow-up meeting. This step helps clarify the meaning the interviewee had in mind and lets the interviewee know that you are interested enough to take the time to understand his or her point of view and perceptions.

FIGURE 4.9
Diamond-shaped structure for interviewing combines the pyramid and funnel structures.



two-to-four-day commitment, it is not possible to do any other activities concurrently or to time-shift any activities, as is typically done in one-on-one interviewing.

A second pitfall occurs if preparation for the JAD sessions is inadequate in any regard or if the follow-up report and documentation of specifications is incomplete. In these instances resulting designs could be less than satisfactory. Many variables need to come together correctly for JAD to be successful. Conversely, many things can go wrong. The success of designs resulting from JAD sessions is less predictable than that achieved through standard interviews.

Finally, the necessary organizational skills and organizational culture may not be sufficiently developed to enable the concerted effort required to be productive in a JAD setting. In the end you will have to judge whether the organization is truly committed to, and prepared for, this approach.

USING QUESTIONNAIRES

The use of questionnaires is an information-gathering technique that allows systems analysts to study attitudes, beliefs, behavior, and characteristics of several key people in the organization who may be affected by the current and proposed systems. Attitudes are what people in the organization say they want (in a new system, for instance); beliefs are what people think is actually true; behavior is what organizational members do; and characteristics are properties of people or things.

Responses gained through questionnaires (also called surveys) using closed questions can be quantified. If you are surveying people via email or the Web, you can use software to turn electronic responses directly into data tables for analysis using a spreadsheet application or statistical software packages. Responses to questionnaires using open-ended questions are analyzed and interpreted in other ways. Answers to questions on attitudes and beliefs are sensitive to the wording chosen by the systems analyst.

Through the use of questionnaires, the analyst may be seeking to quantify what was found in interviews. In addition, questionnaires may be used to determine how widespread or limited a sentiment expressed in an interview really is. Conversely, questionnaires can be used to survey a large sample of system users to sense problems or raise important issues before interviews are scheduled.

Throughout this chapter, we compare and contrast questionnaires with interviews. There are many similarities between the two techniques, and perhaps the ideal would be to use them in conjunction with each other, either following up unclear questionnaire responses with an interview or designing the questionnaire based on what is discovered in the interview. Each technique, however, has its own specific functions, and it is not always necessary or desirable to use both.

Planning for the Use of Questionnaires

At first glance questionnaires may seem to be a quick way to gather massive amounts of data about how users assess the current system, about what problems they are experiencing with their work, and about what people expect from a new or modified system. Although it is true that you can gather a lot of information through questionnaires without spending time in face-to-face interviews, developing a useful questionnaire takes extensive planning time in its own right. When you decide to survey users via email or the Web, you face additional planning considerations concerning confidentiality, authentication of identity, and problems of multiple responses.

You must first decide what you are attempting to gain through using a survey. For instance, if you want to know what percentage of users prefers a FAQ page as a means of learning about new software packages, a questionnaire might be the right technique. If you want an in-depth analysis of a manager's decision-making process, an interview is a better choice.

Here are some guidelines to help you decide whether the use of questionnaires is appropriate. Consider using questionnaires if:

1. The people you need to question are widely dispersed (different branches of the same corporation).
2. A large number of people are involved in the systems project, and it is meaningful to know what proportion of a given group (for example, management) approves or disapproves of a particular feature of the proposed system.
3. You are doing an exploratory study and want to gauge overall opinion before the systems project is given any specific direction.

4. You wish to be certain that any problems with the current system are identified and addressed in follow-up interviews.

Once you have determined that you have good cause to use a questionnaire and have pinpointed the objectives to be fulfilled through its use, you can begin formulating questions.

Writing Questions

The biggest difference between the questions used for most interviews and those used on questionnaires is that interviewing permits interaction between the questions and their meanings. In an interview the analyst has an opportunity to refine a question, define a muddy term, change the course of questioning, respond to a puzzled look, and generally control the context.

Few of these opportunities are possible on a questionnaire. Thus, for the analyst, questions must be transparently clear, the flow of the questionnaire cogent, the respondent's questions anticipated, and the administration of the questionnaire planned in detail. (A respondent is the person who responds to or answers the questionnaire.)

The basic question types used on the questionnaire are open-ended and closed, as discussed for interviewing. Due to the constraints placed on questionnaires, some additional discussion of question types is warranted.

OPEN-ENDED QUESTIONS. Recall that open-ended questions (or statements) are those that leave all possible response options open to the respondent. For example, open-ended questions on a questionnaire might read, "Describe any problems you are currently experiencing with output reports" or "In your opinion, how helpful are the user manuals for the current system's accounting application?"

When you write open-ended questions for a questionnaire, anticipate what kind of response you will get. For instance, if you ask a question such as, "How do you feel about the system?" the responses are apt to be too broad for accurate interpretation or comparison. Therefore, even when you write an open-ended question, it must be narrow enough to guide respondents to answer in a specific way. (Examples of open-ended questions can be found in Figure 4.10.)

Open-ended questions are particularly well suited to situations in which you want to get at organizational members' opinions about some aspect of the system, whether product or process. In such cases you will want to use open-ended questions when it is impossible to list effectively all the possible responses to the question.

CLOSED QUESTIONS. Recall that closed questions (or statements) are those that limit or close the response options available to the respondent. For example, in Figure 4.11 the statement in question 23 ("Below are the six software packages currently available. Please check the software package(s) you personally use most frequently") is closed. Notice that respondents are not asked why the package is preferred, nor are they asked to select more than one, even if that is a more representative response.

Closed questions should be used when the systems analyst is able to list effectively all the possible responses to the question and when all the listed responses are mutually exclusive, so that choosing one precludes choosing any of the others.

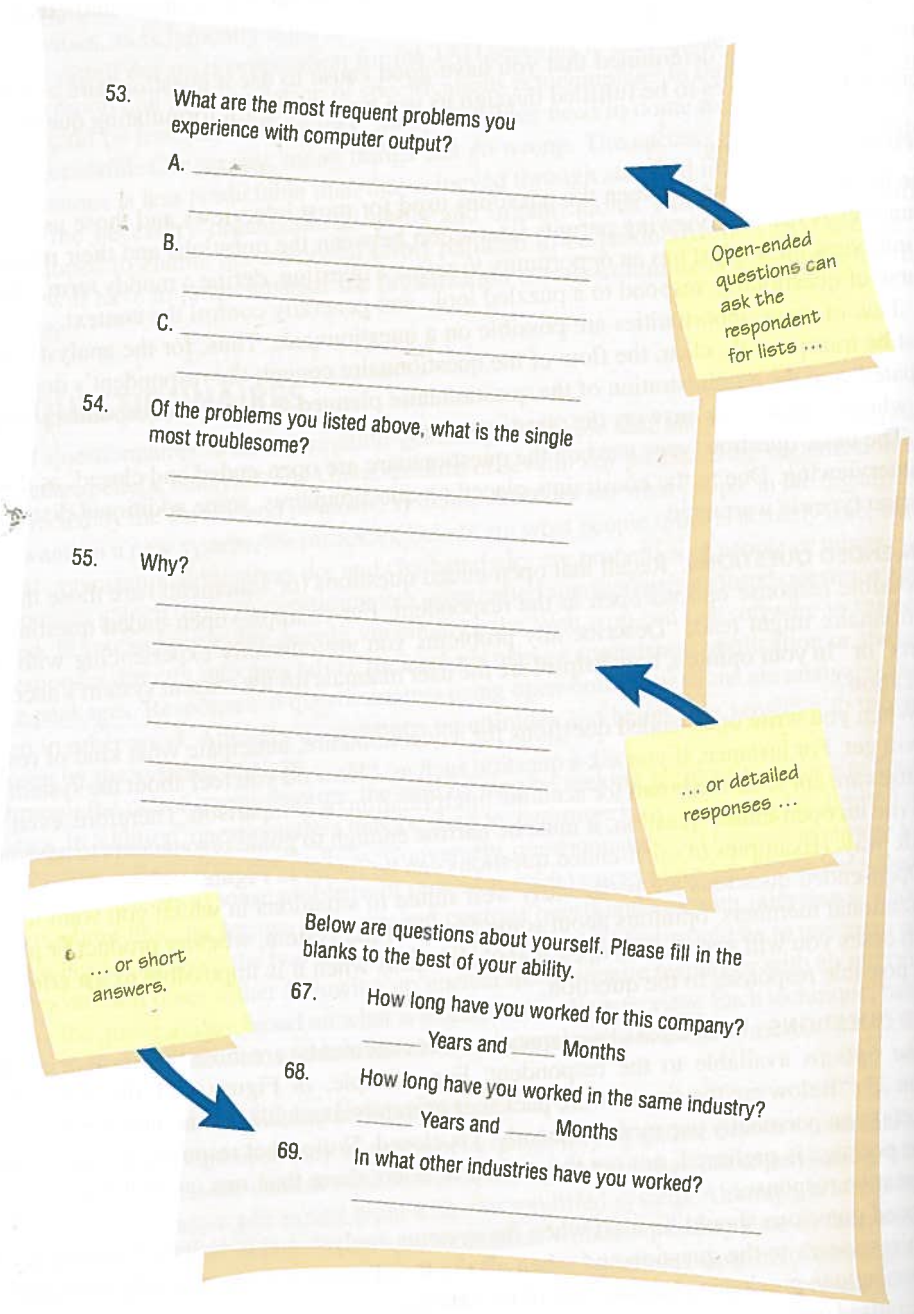
Use closed questions when you want to survey a large sample of people. The reason becomes obvious when you start imagining how the data you are collecting will look. If you use only open-ended questions for hundreds of people, correct analysis and interpretation of their responses becomes impossible without the aid of a computerized content analysis program.

There are trade-offs involved in choosing either open-ended or closed questions for use on questionnaires. Figure 4.12 summarizes these trade-offs. Notice that responses to open-ended questions can help analysts gain rich, exploratory insights as well as breadth and depth on a topic. Although open-ended questions can be written easily, responses to them are difficult and time consuming to analyze.

When we refer to the writing of closed questions with either ordered or unordered answers, we often refer to the process as scaling. The use of scales in surveys is discussed in detail in a later section.

WORD CHOICE. Just as with interviews, the language of questionnaires is an extremely important aspect of their effectiveness. Even if the systems analyst has a standard set of questions

FIGURE 4.10
Open-ended questions used for questionnaires.



concerning systems development, it is wise to write them to reflect the business's own terminology.

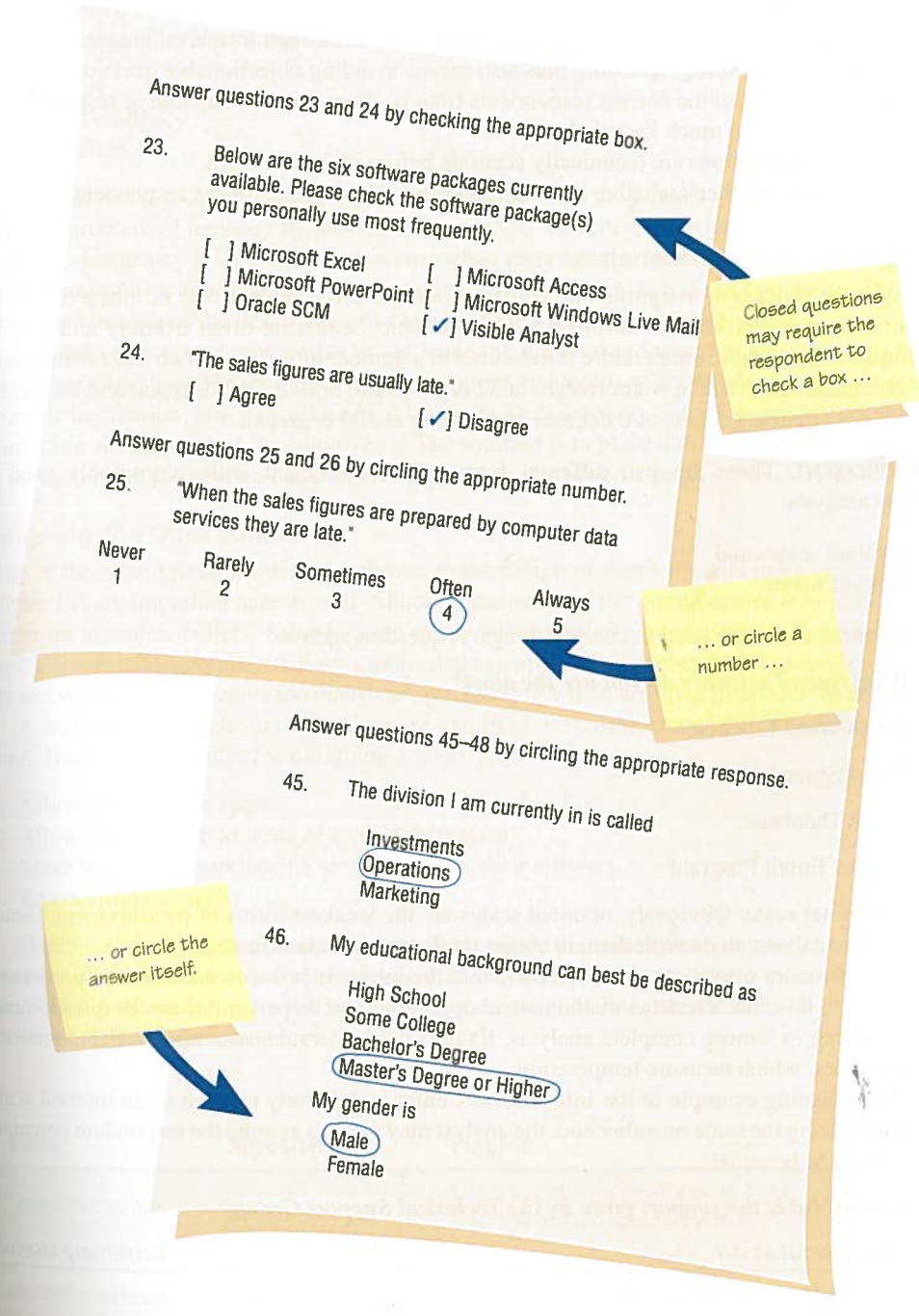
Respondents appreciate the efforts of someone who bothers to write a questionnaire reflecting their own language usage. For instance, if the business uses the term *supervisors* instead of *managers,* or *units* rather than *departments,* incorporating the preferred terms in the questionnaire helps respondents relate to the meaning of the questions. Responses will be easier to interpret accurately, and respondents will be more enthusiastic overall.

To check whether language used on the questionnaire is that of the respondents, try some sample questions on a pilot (test) group. Ask them to pay particular attention to the appropriateness of the wording and to change any words that do not ring true.

Here are some guidelines to use when choosing language for your questionnaire:

1. Use the language of respondents whenever possible. Keep wording simple.
2. Work at being specific rather than vague in wording. Avoid overly specific questions as well.

FIGURE 4.11
Closed questions on questionnaires help ensure responses.



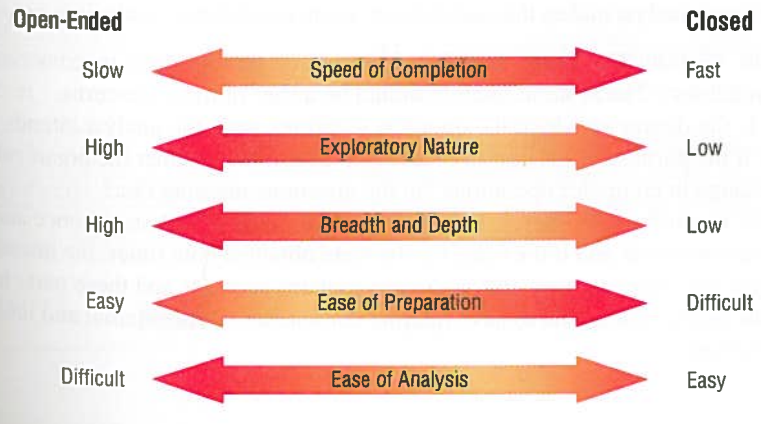


FIGURE 4.12
Trade-offs between the use of open-ended and closed questions on questionnaires.

3. Keep questions short.
4. Do not patronize respondents by talking down to them through low-level language choices.
5. Avoid bias in wording. Avoiding bias also means avoiding objectionable questions.
6. Target questions to the correct respondents (that is, those who are capable of responding). Don't assume too much knowledge.
7. Ensure that questions are technically accurate before including them.
8. Use software to check whether the reading level is appropriate for the respondents.

Using Scales in Questionnaires

Scaling is the process of assigning numbers or other symbols to an attribute or characteristic for the purpose of measuring that attribute or characteristic. Scales are often arbitrary and may not be unique. For example, temperature is measured in a number of ways; the two most common are the Fahrenheit scale (where water freezes at 32 degrees and boils at 212 degrees) and the Celsius scale (where freezing occurs at 0 degrees and boiling at 100 degrees).

MEASUREMENT. There are two different forms of measurement scales commonly used by systems analysts:

1. nominal scales and
2. interval scales.

Nominal scales are used to classify things. A question such as:

What type of software do you use the most?

1 = A Word Processor

2 = A Spreadsheet

3 = A Database

4 = An Email Program

uses a nominal scale. Obviously, nominal scales are the weakest forms of measurement. Generally, all the analyst can do with them is obtain totals for each classification.

Interval scales possess the characteristic that the intervals between each of the numbers are equal. Due to this characteristic, mathematical operations can be performed on the questionnaire data, resulting in a more complete analysis. Examples of interval scales are the Fahrenheit and Celsius scales, which measure temperature.

The foregoing example of the Information Center is definitely not that of an interval scale, but by anchoring the scale on either end, the analyst may want to assume the respondent perceives the intervals to be equal:

How useful is the support given by the Technical Support Group?

Not Useful at All				*Extremely Useful*
1	2	3	4	5

If the systems analyst makes this assumption, more quantitative analysis is possible.

VALIDITY AND RELIABILITY. There are two measures of performance in constructing scales: validity and reliability. The systems analyst should be aware of these concerns.

Validity is the degree to which the question measures what the analyst intends to measure. For example, if the purpose of the questionnaire is to determine whether the organization is ready for a major change in computer operations, do the questions measure that?

Reliability measures consistency. If the questionnaire was administered once and then again under the same conditions and if the same results were obtained both times, the instrument is said to have external consistency. If the questionnaire contains subparts and these parts have equivalent results, the instrument is said to have internal consistency. Both external and internal consistency are important.

CONSTRUCTING SCALES. The actual construction of scales is a serious task. Careless construction of scales can result in one of the following problems:

1. Leniency.
2. Central tendency.
3. Halo effect.

Leniency is a problem caused by respondents who are easy raters. A systems analyst can avoid the problem of leniency by moving the "average" category to the left (or right) of center.

Central tendency is a problem that occurs when respondents rate everything as average. The analyst can improve the scale (1) by making the differences smaller at the two ends, (2) by adjusting the strength of the descriptors, or (3) by creating a scale with more points.

The halo effect is a problem that arises when the impression formed in one question carries into the next question. For example, if you are rating an employee about whom you have a very favorable impression, you may give a high rating in every category or trait, regardless of whether or not it is a strong point of the employee's. The solution is to place one trait and several employees on each page, rather than one employee and several traits on a page.

Designing the Questionnaires

Many of the same principles that are relevant to the design of forms for data input (as covered in Chapter 12) are important here as well. Although the intent of the questionnaire is to gather information on attitudes, beliefs, behavior, and characteristics whose impact may substantially alter users' work, respondents are not always motivated to respond. Remember that organizational members as a whole tend to receive too many surveys, many of which are often ill-conceived and trivial.

A well-designed, relevant questionnaire can help overcome some of this resistance to respond. Here are some rules for designing a good questionnaire:

1. Allow ample white space.
2. Allow ample space to write or type in responses.
3. Make it easy for respondents to clearly mark their answers.
4. Be consistent in style.

When you design questionnaires for the Web, apply the same rules you use when designing paper questionnaires. Most software packages allow you to insert one of the commonly used data entry formats shown in Figure 4.13. Following the four guidelines should help you gain a better response rate to the questionnaire.

Name	Appearance	Purpose
One-line text box		Used to obtain a small amount of text and limit the answer to a few words
Scrolling text box		Used to obtain one or more paragraphs of text
Check box		Used to obtain a yes-no answer (e.g., Do you wish to be included on the mailing list?)
Radio button		Used to obtain a yes-no or true-false answer
Drop-down menu		Used to obtain more consistent results (Respondent is able to choose the appropriate answer from a predetermined list [e.g., a list of state abbreviations])
Push button	Button	Most often used for an action (e.g., a respondent pushes a button marked "Submit" or "Clear")

FIGURE 4.13
When designing a Web survey, keep in mind that there are different ways to capture responses.

CONSULTING OPPORTUNITY 4.4

The Unbearable Questionnaire

"I'm going to go into a depression or at least a slump if someone doesn't figure this out soon," say Penny Stox, office manager for Carbon, Carbon, & Rippy, a large brokerage firm. Penny is sitting across a conference table from you and two of her most productive account executives, By Lowe and Sal Hy. You are all mulling over the responses to a questionnaire that has been distributed among the firm's account executives, which is shown in Figure 4.C1.

"We need a crystal ball to understand these," By and Sal call out together.

"Maybe it reflects some sort of optimistic cycle, or something," Penny says as she reads more of the responses. "Who designed this gem, anyway?"

"Rich Kleintz," By and Sal call out in unison.

"Well, as you can see, it's not telling us anything!" Penny exclaims.

Penny and her staff are dissatisfied with the responses they have received on the unbearable questionnaire, and they feel that the responses are unrealistic reflections of the amount of information account executives want. In a paragraph, state why these problems are occurring. On a separate sheet, change the scaling of the questions to avoid these problems.

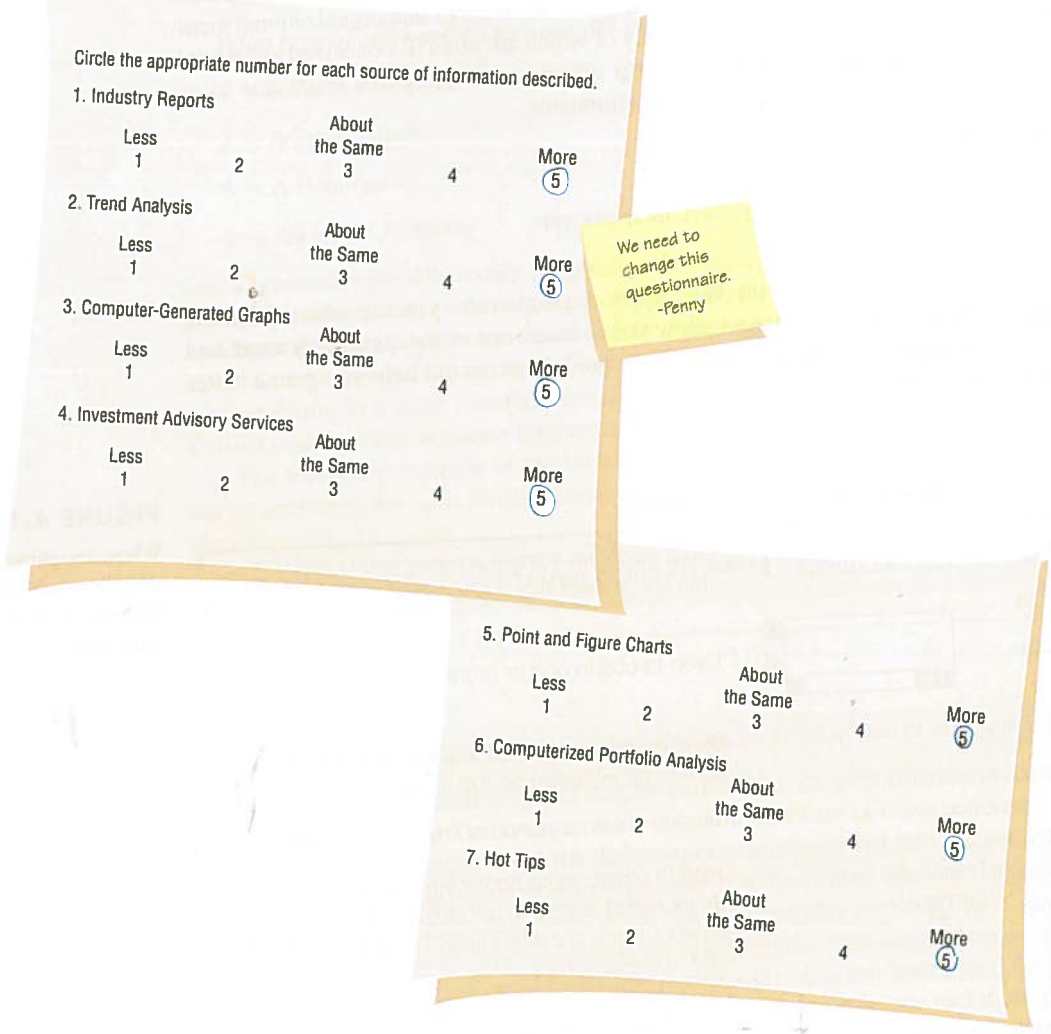


FIGURE 4.C1
Questionnaire developed for the brokerage firm of Carbon, Carbon, & Rippy by Rich Kleintz.

CONSULTING OPPORTUNITY 4.5

Order in the Courts

"I love my work," Tennys says, beginning the interview with a volley. "It's a lot like a game. I keep my eye on the ball and never look back," he continues. Tennyson "Tennys" Courts is a manager for Global Health Spas, Inc., which has popular health and recreation spas worldwide.

"Now that I've finished my MBA, I feel like I'm on top of the world with Global," Tennys says. "I think I can really help this outfit shape up with its computers and health spas."

Tennys is attempting to help your systems group, which is developing a system to be used by all 80 outlets (where currently each group handles its paperwork in its own way). "Can I bounce this off you?" he asks Terri Towell, a member of your team of systems analysts. "It's a questionnaire I designed for distribution to all spa managers."

Ever the good sport, Terri tells Tennys that she'd love to take a look at the form. But back in the office, Terri puts the ball in your court. Systematically critique Tennys's technique as depicted in Figure 4.C2, and explain to him point by point what it needs to be a matchless questionnaire with a winning form. Building on your critique, tell Tennys what he should do to rewrite the form as a Web survey instead.

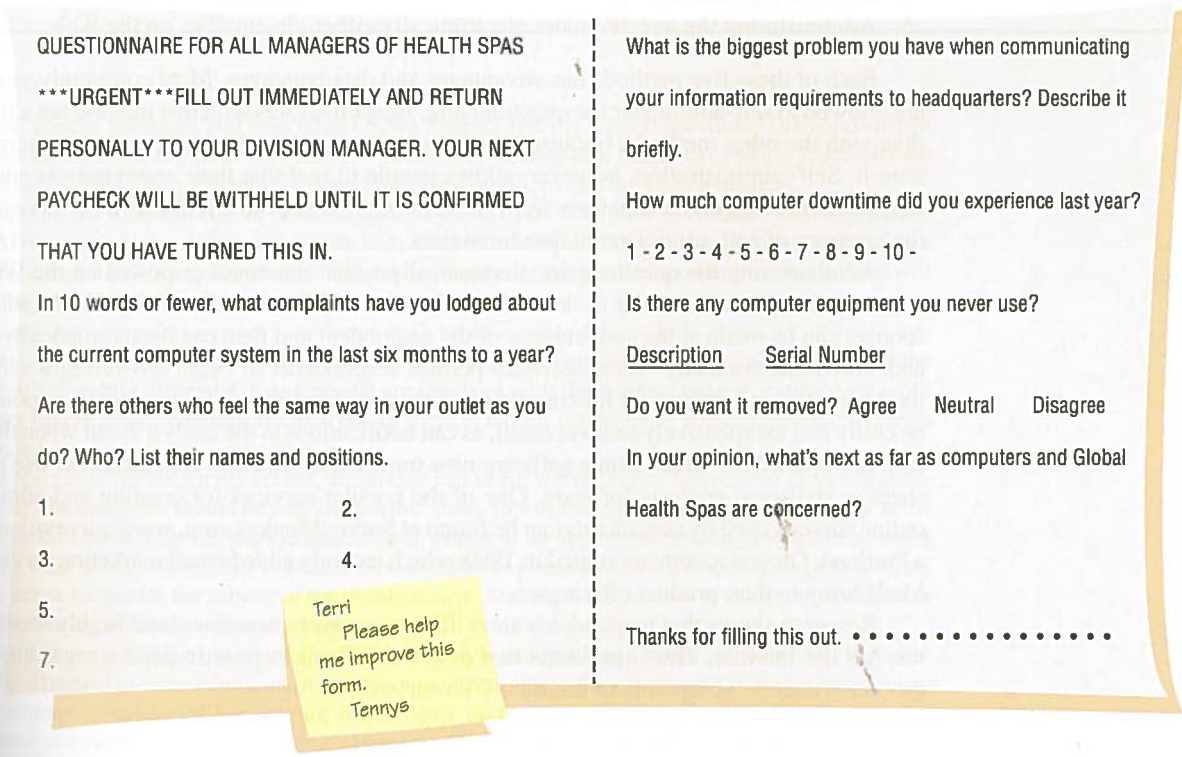


FIGURE 4.C2
Questionnaire developed for managers of Global Health Spas by Tennys Courts.

QUESTION ORDER. There is no best way to order questions on the questionnaire. Once again, as you order questions, you must think about your objectives in using the questionnaire and then determine the function of each question in helping you to achieve your objectives. It is also important to see the questionnaire through the respondent's eyes. Some guidelines for ordering questions are:

1. Place questions that are important to respondents first.
2. Cluster items of similar content together.
3. Introduce less controversial questions first.

You want respondents to feel as unthreatened by and interested in the questions being asked as possible, without getting overwrought about a particular issue.

Administering Questionnaires

RESPONDENTS. Deciding who will receive the questionnaire is handled in conjunction with the task of setting up objectives for its results. Sampling, which is covered in Chapter 5, helps the systems analyst to determine what sort of representation is necessary and hence what kind of respondents should receive the questionnaire.

Recipients are often chosen as representative because of their rank, length of service with the company, job duties, or special interest in the current or proposed system. Be sure to include enough respondents to allow for a reasonable sample in the event that some questionnaires are not returned or some response sheets are incorrectly completed and thus must be discarded.

METHODS OF ADMINISTERING THE QUESTIONNAIRE. The systems analyst has several options for administering the questionnaire, and the choice of administration method is often determined by the existing business situation. Options for administering the questionnaire include the following:

1. Convening all concerned respondents together at one time.
2. Personally handing out blank questionnaires and taking back completed ones.
3. Allowing respondents to self-administer the questionnaire at work and drop it in a centrally located box.
4. Mailing questionnaires to employees at branch sites and supplying a deadline, instructions, and return postage.
5. Administering the questionnaire electronically either via email or on the Web.

Each of these five methods has advantages and disadvantages. Most commonly, respondents are allowed to self-administer the questionnaire. Response rates with this method are a little lower than with the other methods, because people may forget about the form, lose it, or purposely ignore it. Self-administration, however, allows people to feel that their anonymity is ensured and may result in less guarded answers from some respondents. Both email and Web surveys fall into the category of self-administered questionnaires.

Administering the questionnaire electronically, either via email or posted on the Web, is one way to quickly reach current system users. Costs of duplication are minimized. In addition, responses can be made at the convenience of the respondent and then can be automatically collected and stored electronically. Some software permits respondents to begin answering a survey, save their answers, and return to it for completion if they are interrupted. Reminders to respondents can be easily and inexpensively sent via email, as can notifications to the analyst about when the respondent has opened the email. Some software now turns email data into data tables for use in spreadsheet or statistical analysis software. One of the popular services for creating and administering online surveys used by consultants can be found at SurveyMonkey.com, www.surveymonkey.com, a Portland, Oregon, company started in 1999, which recently added email marketing services called MailChimp to their product offerings.

Research shows that respondents are willing to answer questions about highly sensitive matters via the Internet. Thus, questions that may be difficult to pose in person regarding systems problems may be acceptable to ask on a Web survey.

SUMMARY

This chapter covers three of the key interactive methods for information gathering that the systems analyst can use, including interviewing, JAD, and construction of questionnaires. During the process of interviewing analysts, listen for HCI concerns relating to ergonomics, aesthetics, usability, and usefulness, as well as goals, feelings, opinions, and informal procedures in interviews with organizational decision makers. Interviews are planned question-and-answer dialogues between two people. Analysts use the interview to develop their relationship with a client, to observe the workplace, and to collect data. Interviews should preferably be conducted in person.

The five steps to take in planning the interview are to read background material, establish interviewing objectives, decide whom to interview, prepare the interviewee, and decide on question types and structure.

Questions are of two basic types: open-ended or closed. Open-ended questions leave open all response options for the interviewee. Closed questions limit the possible options for response. Probes or follow-up questions can be either open-ended or closed, but they ask the respondent for a more detailed reply.

Interviews can be structured in three basic ways: pyramid, funnel, or diamond. Pyramid structures begin with detailed, closed questions and broaden to more generalized questions. Funnel structures begin with

DETERMINING SAMPLE SIZE WHEN INTERVIEWING. There are no magic formulas to help the systems analyst set the sample size for interviewing. The overriding variable that determines how many people the systems analyst should interview in depth is the time an interview takes. A true in-depth interview and follow-up interview is very time consuming for both the interviewer and the participant.

A good rule of thumb is to interview at least three people on every level of the organization and at least one from each of the organization's functional areas (as described in Chapter 2) who will work directly with a new or updated system. Remember also that one does not have to interview more people just because it is a larger organization. If the stratified sample is done properly, a small number of people will adequately represent the entire organization.

INVESTIGATION

Investigation is the act of discovery and analysis of data. While investigating evidence in an organization, the analyst acts like Sherlock Holmes, the fabled detective from 221B Baker Street.

As the systems analyst works to understand users, their organization, and its information requirements, it will become important to examine different types of hard data that offer information unavailable through any other method of data gathering. Hard data reveal where the organization has been and where its members believe it is going. To piece together an accurate picture, the analyst needs to examine both quantitative and qualitative hard data.

Analyzing Quantitative Documents

Many quantitative documents are available for interpretation in any business, and they include reports used for decision making, performance reports, records, and a variety of forms. All these documents have a specific purpose and audience for which they are targeted.

REPORTS USED FOR DECISION MAKING. A systems analyst needs to obtain some of the documents that are used in running the business. These documents are often paper reports regarding the status of inventory, sales, or production. Many of these reports are not complex, but they serve mainly as feedback for quick action. For example, a sales report may summarize the amount sold and the type of sales. In addition, sales reports might include graphical output comparing revenue and income over a set number of periods. Such reports enable the decision maker to spot trends easily.

Production reports include recent costs, current inventory, recent labor, and plant information. Beyond these key reports, many summary reports are used by decision makers to provide background information, spot exceptions to normal occurrences, and afford strategic overviews of organizational plans.

PERFORMANCE REPORTS. Most performance reports take on the general form of actual versus intended performance. One important function of performance reports is to assess the size of the gap between actual and intended performance. It is also important to be able to determine if that gap is widening or narrowing as an overall trend in whatever performance is being measured. Figure 5.3 shows a clear improvement in sales performance over two to three months. The analyst will want to note if performance measurement is available and adequate for key organizational areas.

RECORDS. Records provide periodic updates of what is occurring in the business. If the record is updated in a timely fashion by a careful recorder, it can provide much useful information to the analyst. Figure 5.4 is a manually completed payment record for an apartment rental. There are several ways that the analyst can inspect a record, many of which are indicative of their usability:

1. Checking for errors in amounts and totals.
2. Looking for opportunities for improving the recording form design.
3. Observing the number and type of transactions.
4. Watching for instances in which the computer can simplify the work (i.e., calculations and other data manipulation).

DATA CAPTURE FORMS. Before you set out to change the information flows in the organization, you need to be able to understand the system that is currently in place. You or one of your team

CONSULTING OPPORTUNITY 5.2

A Rose by Any Other Name...Or Quality, Not Quantities

"I think we have everything we need. I've sampled financial statements, sales figures for each branch, wastage for each shop—we have it all. With all these numbers, we should be able to figure out how to keep Fields in the green, or at least at the forefront of the flower business. We can even show Seymour Fields himself how his new computer system can make it all happen," says Rod Golden, a junior systems analyst working for a medium-sized consulting group.

The firm, under the supervision of its head systems analyst, Clay Potts, has been working on a systems project for the entire chain of 15 successful florist shops and indoor floral markets called Fields. Each of three Midwestern cities has five Fields outlets.

"Although it's just a budding enterprise now, eventually we want to grow with offshoots to half a dozen states," says Seymour Fields, the owner. "I want to reap the benefits of all the happiness we've sown so far. I think we can do it by playing my hunches about what is the best time to purchase flowers at each European market we buy from, and then we should prune back our purchases.

"Over the past three years, I've written lots of memos to our managers about this plan. They've written some good ones back, too. I think we're ready to stake out some territory on this soon," continues Seymour, painting a rosy picture of Fields's future.

"I agree," says Rod. "When I come back from my analysis of these figures," he says, indicating a large stack of material he has unearthed from Fields field offices, "we'll be able to deliver."

Three weeks later, Rod returns to Clay with wilting confidence. "I don't know what to make of all this. I can't seem to get at what's causing the company's growth, or how it's managed. They've been expanding, but I've been through all the figures, and nothing really seems to make sense yet."

Clay listens empathetically, then says, "You've given me a germ of an idea. What we need is some cross-pollination, a breath of fresh air. We need to dig a little deeper. Did you examine anything but their bottom line?"

Rod looks startled and replies, "No, I—uh—what do you mean?"

How can Clay Potts tactfully explain to Rod Golden that examination of qualitative as well as quantitative documents could be important to delivering an accurate assessment of Fields's potential to be a more fruitful enterprise? In a paragraph, recommend some specific documents that should be read. List the specific steps Rod should follow in evaluating qualitative documents obtained from Fields. Write a paragraph to explain how qualitative documents help in presenting an overall account of Fields's success.

Week	Number of Batches Produced	Number of Batches Rejected	Percentage Rejected	Amount Away from 5% Goal
2/2	245	19	7.8	2.8
2/9	229	19	8.3	3.3
2/16	219	14	6.3	1.3
2/23	252	13	5.2	0.2
3/2	245	13	5.3	0.3
3/9	260	13	5.0	* * *
3/16	275	14	5.1	0.1
3/23	260	13	5.0	* * *
3/30	260	13	5.0	* * *
4/6	244	12	4.9	* * *
4/13	242	11	4.5	* * *
4/20	249	11	4.4	* * *
4/27	249	11	4.4	* * *

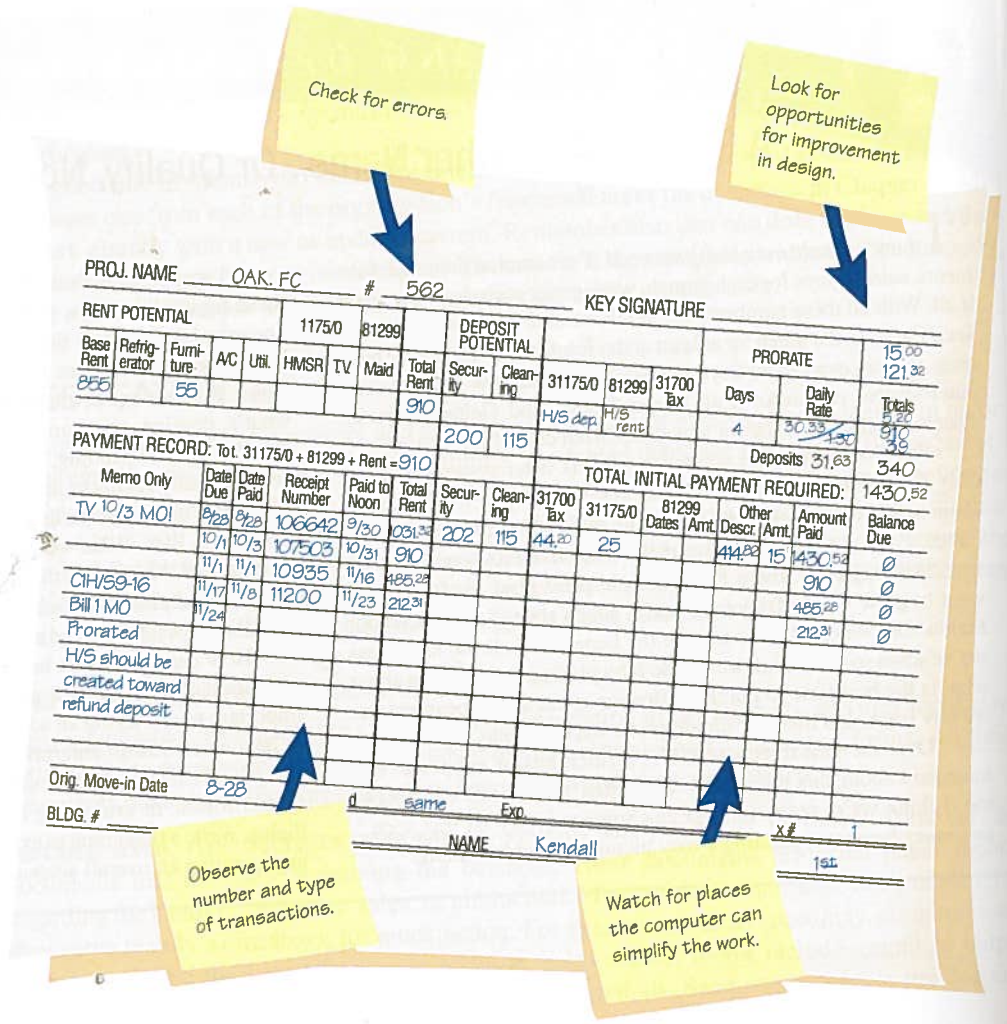
* * * indicates met or exceeded the < 5% goal

Performance reports show goals ...

... and trends.

FIGURE 5.3
A performance report showing improvement.

FIGURE 5.4
A manually completed payment record.



members may want to collect and catalog a blank copy of each form (official or unofficial) that is in use. (Sometimes businesses have a person already charged with forms management, who would be your first source for forms in use.)

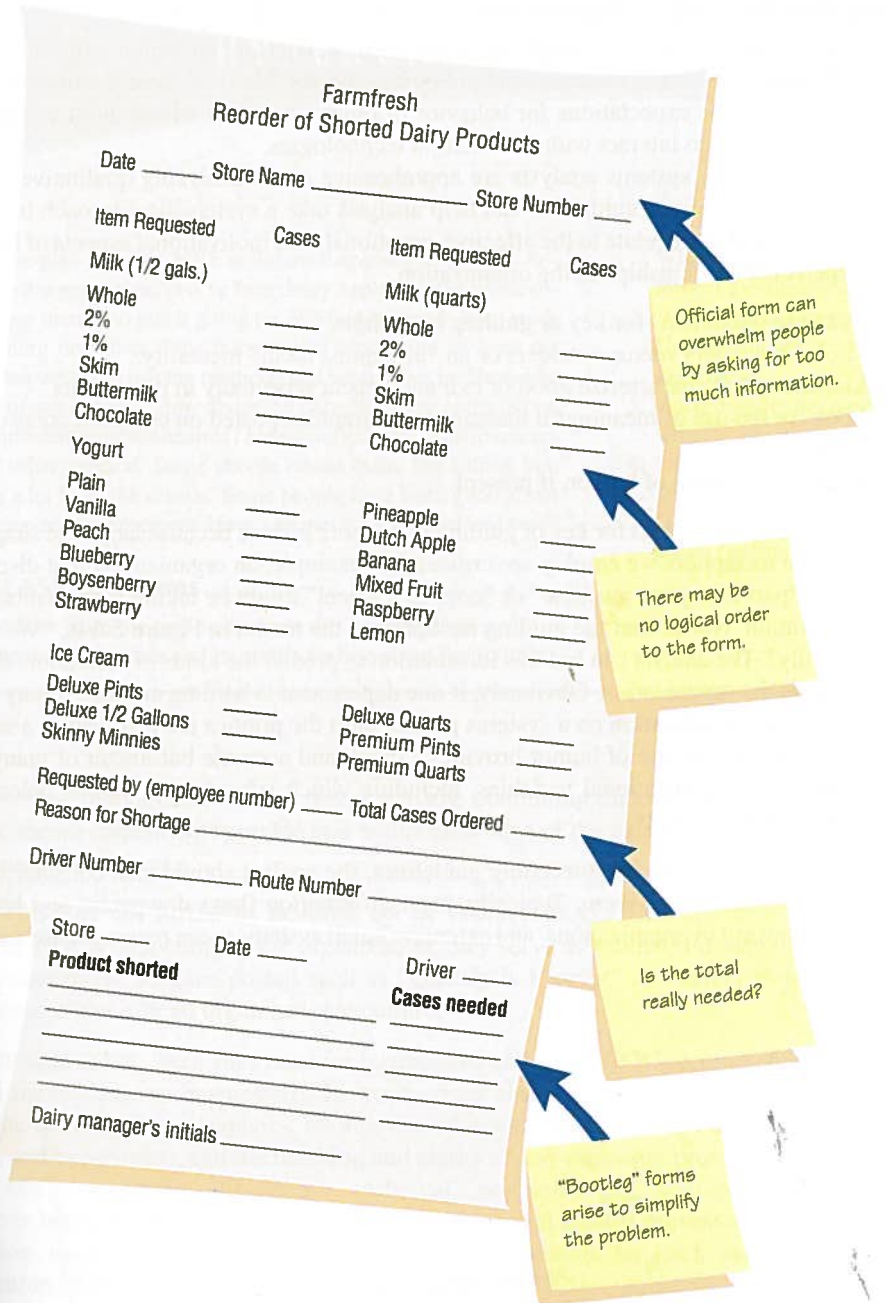
Blank forms, along with their instructions for completion and distribution, can be compared with filled-in forms to see if any data items are consistently left blank on the forms; whether the people who are supposed to receive the forms actually do get them; and if they follow standard procedures for using, storing, and discarding them. Remember to print out any Web-based forms that require users to print them. Alternatively, electronic versions that can be submitted via the Web or email can be identified and stored in a database for later inspection.

To proceed when creating a catalog of forms to help you understand the information flow currently in use in the business:

1. Collect examples of all the forms in use, whether officially sanctioned by the business or not (official versus bootleg forms).
2. Note the type of form (whether printed in-house, handwritten, computer-generated in-house, online forms, Web fill-in forms, printed externally and purchased, etc.).
3. Document the intended distribution pattern.
4. Compare the intended distribution pattern with who actually receives the form.

Although this procedure is time consuming, it is useful. Another approach is to sample data capture forms that have already been completed. Remember to check databases that store consumer data when sampling input from ecommerce transactions. The analyst must keep in mind

FIGURE 5.5
Questions to ask about official and bootleg forms that are already filled out.



many particular questions, as illustrated in Figure 5.5. They include the following aspects of HCI relating to usability, aesthetics, and usefulness:

1. Is the form filled out in its entirety? If not, what items have been omitted, and are they consistently omitted? Why?
2. Are there forms that are never used? Why? (Check the design and appropriateness of each form for its purported function.)
3. Are all copies of forms circulated to the proper people or filed appropriately? If not, why not? Can people who must access online forms do so?
4. If there is a paper form that is offered as an alternative to a Web-based form, compare the completion rates for both.
5. Are "unofficial" forms being used on a regular basis? (Their use might indicate a problem in standard procedures or may indicate political battles in the organization.)

Analyzing Qualitative Documents

Qualitative documents include email messages, memos, signs on bulletin boards and in work areas, Web pages, procedure manuals, and policy handbooks. Many of these documents are rich in details revealing the expectations for behavior of others that their writers hold and the ways in which users expect to interact with information technologies.

Although many systems analysts are apprehensive about analyzing qualitative documents, they need not be. Several guidelines can help analysts take a systematic approach to this sort of analysis. Many of these relate to the affective, emotional, and motivational aspects of HCI, as well as interpersonal relationships in the organization.

1. Examine documents for key or guiding metaphors.
2. Look for insiders versus outsiders or an "us against them" mentality.
3. List terms that characterize good or evil and appear repeatedly in documents.
4. Look for the use of meaningful messages and graphics posted on common areas or on Web pages.
5. Recognize a sense of humor, if present.

Examining documents for key or guiding metaphors is done because language shapes behavior; thus, the metaphors we employ are critical. For example, an organization that discusses employees as "part of a great machine" or "cogs in a wheel" might be taking a mechanistic view of the organization. Notice that the guiding metaphor in the memo in Figure 5.6 is, "We're one big happy family." The analyst can use this information to predict the kinds of metaphors that will be persuasive in the organization. Obviously, if one department is battling another, it may be impossible to gain any cooperation on a systems project until the politics are resolved in a satisfactory manner. Assessing the use of humor provides a quick and accurate barometer of many HCI, interpersonal, and organizational variables, including which subculture a person belongs to and what kind of morale exists.

MEMOS. Along with the five preceding guidelines, the analyst should also consider who sends memos and who receives them. Typically, most information flows downward and horizontally rather than upward in organizations, and extensive email systems mean messages are sent to many

FIGURE 5.6
Analysis of memos provides insight into the metaphors that guide the organization's thinking.

MEMO

To: All Night Call Desk Staff
From: S. Leep, Night Manager
Date: 2/15/2010
Re: Get Acquainted Party Tonight

It's a pleasure to welcome two new 11-7 Call Desk staff members, Twyla Tine and Al Knight. I'm sure they'll enjoy working here. Being together in the wee hours makes us feel like one big happy family. Remember for your breaks tonight that some of the crew has brought in food. Help yourself to the spread you find in the break room, and welcome to the clan, Twyla and Al.

HYPERCASE® EXPERIENCE 5.1

"We're glad you find MRE an interesting place to consult. According to the grapevine, you've been busy exploring the home office. I know, there's so much going on. We find it hard to keep track of everything ourselves. One thing we've made sure of over the years is that we try to use the methods that we believe in. Have you seen any of our reports? How about the data that were collected on one of Snowden's questionnaires? He seems to favor questionnaires over any other method. Some people resent them, but I think you can learn a lot from the results. Some people have been good about cooperating on these projects. Have you met Kathy Blandford yet?"

HYPERCASE Questions

1. Use clues from the case to evaluate the Training Unit's computer experience and its staff's feeling about the PSRS. What do you think the consensus is in the Training Unit toward a computerized project tracking system?
2. What reports and statements are generated by the Training Unit during project development? List each with a brief description.
3. According to the interview results, what are the problems with the present project tracking system in the Training Unit?
4. Describe the "project management conflict" at MRE. Who is involved? Why is there a conflict?
5. How does the Management Systems Unit keep track of project progress? Briefly describe the method or system.

work groups and individuals. Memos reveal a lively, continuing dialogue in the organization. Analysis of memo content will provide you with a clear idea of the values, attitudes, and beliefs of organizational members.

SIGNS OR POSTERS ON BULLETIN BOARDS OR IN WORK AREAS. Although signs may seem incidental to what is happening in the organization, they serve as subtle reinforcers of values to those who read them. Slogans posted such as "Quality Is Forever" or "Safety First" give the analyst a sense of the official organizational culture.

CORPORATE WEB SITES. Web sites used for business-to-consumer (B2C) ecommerce as well as those used for business-to-business (B2B) transactions should also be viewed by the analyst. Examine the contents for metaphors, humor, use of design features (such as color, graphics, animation, and hyperlinks), and the meaning and clarity of any messages provided. Think about the Web site from three dimensions: technical, aesthetic, and managerial. Are there discrepancies between the stated goals of the organization and what is presented to the intended viewer? How much customization of the Web site is available for each user? How much personalization of the Web site is possible? If you are not designing ecommerce sites for the organization, how does what you see on its Web site affect the systems you are investigating? Remember to note the level of interactivity of the Web site or sites, the accessibility of the messages, and the security level.

MANUALS. Other qualitative documents the analyst should examine are organizational manuals, including manuals for computer operating procedures and online manuals. Manuals should be analyzed following the five guidelines spelled out previously. Remember that manuals present the "ideal," the way machines and people are expected to behave. It is important to recall that printed manuals are rarely kept current and are sometimes relegated to a shelf, unused.

POLICY HANDBOOKS. The last type of qualitative document we consider is the policy handbook. Although these documents typically cover broad areas of employee and corporate behavior, you can be primarily concerned with those that address policies about computer services, use, access, security, and charges. Examining policies allows the systems analyst to gain an awareness of the values, attitudes, and beliefs guiding the corporation.

OBSERVING A DECISION MAKER'S BEHAVIOR

Observing decision makers, their physical environment, and their interaction with their physical, ergonomic environment is an important unobtrusive method for the systems analyst. Through observing activities of decision makers, the analyst seeks to gain insight about what is actually done, not just what is documented or explained. In addition, through observation of the decision maker, the analyst attempts to see firsthand the relationships that exist between decision makers and other organizational members. Observation of decision makers' interactions with technologies can also reveal important clues regarding HCI concerns, such as how well the system fits with the user.

Observing a Typical Manager's Decision-Making Activities

Managers' workdays have been described as a series of interruptions punctuated by short bursts of work. In other words, pinning down what a manager "does" is a slippery proposition even under the best of circumstances. For the systems analyst to grasp adequately how managers characterize their work, interactive interviews and questionnaires are used. Observation, however, allows the analyst to see firsthand how managers gather, process, share, and use information and technology to get work done.

Although it is possible to describe and document how managers make decisions using boxes and arrows, we are primarily describing humans and their activities. Therefore, we suggest that systems analysts use a more humanistic approach to describe what managers do. This method is called the analyst's playscript. With this technique the "actor" is the decision maker who is observed "acting" or making decisions. In setting up a playscript, the actor is listed in the left-hand column and all his or her actions are listed in the right-hand column, as shown in Figure 5.7. All activities are recorded with action verbs, so that a decision maker would be described as "talking," "sampling," "corresponding," and "deciding."

Playscript is an organized and systematic approach that demands the analyst be able to understand and articulate the action taken by each observed decision maker. This approach eventually assists the systems analyst in determining what information is required for major or frequent decisions made by the observed people. For instance, from the quality assurance manager example in the playscript, it becomes clear that even though this decision maker is on the middle management level, he or she still requires a fair amount of external information to perform the required activities of this specific job.

OBSERVING THE PHYSICAL ENVIRONMENT

Observing the activities of decision makers is just one way to assess their information requirements. Observing the physical environment where decision makers work also reveals much about their human information requirements. Most often, such observing means systematically examining the offices of decision makers, because offices constitute their primary workplace. Decision makers influence and are in turn influenced by their physical environments and by their interactions with the technology that takes place there. Many HCI concerns can be identified through structured observation and confirmed with other techniques, such as interviews or questionnaires.

Structured Observation of the Environment (STROBE)

Film critics sometimes use a structured form of criticism called mise-en-scène analysis to systematically assess what is in a single shot of the film. They look at editing, camera angle, set decor, and the actors and their costumes to find out how they are shaping the meaning of the film as intended by the director. Sometimes the film's mise-en-scène will contradict what is said in the dialogue. For information requirements analysis, the systems analyst can take on a role similar to that of the film critic. It often is possible to observe the particulars of the surroundings that will confirm or negate the organizational narrative (also called "stories" or "dialogue") that is found through interviews or questionnaires.

The method for *STR*uctured *OB*servation of the *E*nvironment is referred to as STROBE. Successful application of STROBE requires that an analyst explicitly observe seven concrete elements commonly found in offices. The seven observable elements and some key questions that may arise are listed in Figure 5.8. These elements can reveal much about the way a decision maker gathers, processes, stores, and shares information, as well as about the decision maker's credibility in the workplace.

OFFICE LOCATION. One of the first elements a systems analyst should observe is the location of a particular decision maker's office with respect to other offices. Accessible offices tend to increase interaction frequency and informal messages, whereas inaccessible offices tend to decrease the interaction frequency and increase task-oriented messages. Offices distributed along the perimeter of the building usually result in a report or memo being held up in one of the offices, whereas office clusters encourage information sharing. It is also likely that the people whose

Playscript Analysis Company: Solid Steel Shelving Scenario: Quality Assurance
Analyst: L. Bracket Date: 1/3/2010

Decision Maker (Actor)	Information-Related Activity (Script)
Quality Assurance Manager	Asks shop floor supervisor for the day's production report
Shop Floor Supervisor	Prints out daily computerized production report
	Discusses recurring problems in production runs with quality assurance (QA) manager
Quality Assurance Manager	Reads production report
	Compares current report with other reports from the same week
	Inputs data from daily production run into QA model on computer
	Observes onscreen results of QA model
	Calls steel suppliers to discuss deviations from quality standards
Shop Floor Supervisor	Attends meeting on new quality specifications with quality assurance manager and vice president of production
Quality Assurance Manager	Drafts letter to inform suppliers on new quality specifications agreed on in meeting
	Sends draft to vice president via email
Vice President of Production	Reads drafted letter
	Returns corrections and comments via email
Quality Assurance Manager	Reads corrected letter on email
	Rewrites letter to reflect changes

FIGURE 5.7
A sample page from the analyst's playscript describing decision making.

	Interviews	Joint Application Design	Questionnaires	Document Analysis	Observation
Type of information	As-is, improvements, to-be	As-is, improvements, to-be	As-is, improvements	As-is	As-is
Depth of information	High	High	Medium	Low	Low
Breadth of information	Low	Medium	High	High	Low
Integration of information	Low	High	Low	Low	Low
User involvement	Medium	High	Low	Low	Low
Cost	Medium	Low–Medium	Low	Low	Low to Medium

FIGURE 3-13 Table of Requirements-Gathering Techniques

Observation is often used to supplement interview information. The location of a person's office and its furnishings give clues to the person's power and influence in the organization and can be used to support or refute information given in an interview. For example, an analyst might become skeptical of someone who claims to use the existing computer system extensively if the computer is never turned on while the analyst visits. In most cases, observation supports the information that users provide in interviews. When it does not, it is an important signal that extra care must be taken in analyzing the business system.

Selecting the Appropriate Techniques

Each of the requirements-gathering techniques discussed earlier has strengths and weaknesses. No one technique is always better than the others, and in practice most projects use a combination of techniques. Thus, it is important to understand the strengths and weaknesses of each technique and when to use each (see Figure 3-13). One issue not discussed is that of the analysts' experience. In general, document analysis and observation require the least amount of training, whereas JAD sessions are the most challenging.

Type of Information The first characteristic is type of information. Some techniques are more suited for use at different stages of the analysis process, whether understanding the as-is system, identifying improvements, or developing the to-be system. Interviews and JAD are commonly used in all three stages. In contrast, document analysis and observation usually are most helpful for understanding the as-is, although occasionally they provide information about current problems that need to be improved. Questionnaires are often used to gather information about the as-is system as well as general information about improvements.

Depth of Information The depth of information refers to how rich and detailed the information is that the technique usually produces and the extent to which the technique is useful for obtaining not only facts and opinions but also an understanding of *why* those facts and opinions exist. Interviews and JAD sessions are very useful for providing a good depth of rich and detailed information and helping the analyst to understand the reasons behind them. At the other extreme, document analysis and observation are useful for obtaining facts, but little beyond that. Questionnaires can provide a medium depth of information, soliciting both facts and opinions with little understanding of why they exist.

Breadth of Information Breadth of information refers to the range of information and information sources that can be easily collected using the chosen technique. Questionnaires

and document analysis are both easily capable of soliciting a wide range of information from a large number of information sources. In contrast, interviews and observation require the analyst to visit each information source individually and, therefore, take more time. JAD sessions are in the middle because many information sources are brought together at the same time.

Integration of Information One of the most challenging aspects of requirements gathering is integrating the information from different sources. Simply put, different people can provide conflicting information. Combining this information and attempting to resolve differences in opinions or facts is usually very time consuming because it means contacting each information source in turn, explaining the discrepancy, and attempting to refine the information. In many cases, the individual wrongly perceives that the analyst is challenging his or her information, when in fact it is another user in the organization who is doing so. This can make the user defensive and make it hard to resolve the differences.

All techniques suffer integration problems to some degree, but JAD sessions are designed to improve integration because all information is integrated when it is collected, not afterward. If two users provide conflicting information, the conflict becomes immediately obvious, as does the source of the conflict. The immediate integration of information is the single most important benefit of JAD that distinguishes it from other techniques, and this is why most organizations use JAD for important projects.

User Involvement User involvement refers to the amount of time and energy the intended users of the new system must devote to the analysis process. It is generally agreed that as users become more involved in the analysis process, the chance of success increases. However, user involvement can have a significant cost, and not all users are willing to contribute valuable time and energy. Questionnaires, document analysis, and observation place the least burden on users, whereas JAD sessions require the greatest effort.

Cost Cost is always an important consideration. In general, questionnaires, document analysis, and observation are low-cost techniques (although observation can be quite time consuming). The low cost does not imply that they are more or less effective than the other techniques. Interviews and JAD sessions generally have moderate costs. In general, JAD sessions are much more expensive initially, because they require many users to be absent from their offices for significant periods of time, and they often involve highly paid consultants. However, JAD sessions significantly reduce the time spent in information integration and thus can cost less in the long term.

Combining Techniques In practice, requirements gathering combines a series of different techniques. Most analysts start by using interviews with senior manager(s) to gain an understanding of the project and the big-picture issues. From these interviews, it becomes clear whether large or small changes are anticipated. These interviews are often followed with analysis of documents and policies to gain some understanding of the as-is system. Usually interviews come next to gather the rest of the information needed for the as-is picture.

In our experience, identifying improvements is most commonly done using JAD sessions because the JAD session enables the users and key stakeholders to work together through an analysis technique and come to a shared understanding of the possibilities for the to-be system. Occasionally, these JAD sessions are followed by questionnaires sent to a much wider set of users or potential users to see whether the opinions of those who participated in the JAD sessions are widely shared.