Conducting Internal Audit Engagements—Audit Tools and Techniques (28–38%)

3.1 Data-Gathering Tools and Techniques
Auditors use several data-gathering tools and techniques to obtain background information on the auditee’s operations and to collect audit evidence and pertinent data for the audit purpose. Either statistical or nonstatistical sampling methods can be used to collect audit evidence and to control risk. Specific data-gathering tools and techniques include interviews, questionnaires, checklists, focus groups, observations, unobtrusive measures, and anecdotal records (see Exhibit 3.1).

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- Interviews (expensive, require good preparation)
- Questionnaires (popular, inexpensive way of getting information; a benefit-risk analysis is needed)
- Checklists (ensure that all actions are completed)
- Focus groups (good for exploring ideas and opinions)
- Observation (good for direct evidence)
- Unobtrusive measures (techniques not readily noticeable to others)
- Anecdotal records (used to describe a specific situation such as fraud or performance evaluation)

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EXHIBIT 3.1 Data-Gathering Tools and Techniques
(a) Interviews

(i) Types of Interviews

Interviews are of two types: structured and unstructured (i.e., less structured). A **structured interview** is one in which auditors ask the same questions of numerous individuals or individuals representing numerous organizations in a precise manner, offering each interviewee the same set of possible responses.\(^1\) In contrast, an **unstructured interview** contains many open-ended questions that are not asked in a structured, precise manner. With unstructured interviews, different auditors interpret questions and often offer different explanations when respondents ask for clarification. The structured interview technique is good to apply in an organization with multiple locations, units, or divisions. The less structured and less guided type of unstructured interview may be more useful to one-of-a-kind interview.

**STRUCTURED VERSUS UNSTRUCTURED INTERVIEWS**

- Structured interviews are good for repetitive types of interviews.
- Unstructured interviews are good for one-of-a-kind interviews.

The telephone interview and, even more, the face-to-face interview enable the interviewer to establish rapport with respondents. Individuals who would not answer certain questions on their own can be persuaded to provide truthful answers in a telephone or face-to-face interview.

In comparison to the telephone interview, the face-to-face interview gives the interviewer the opportunity to observe as well as listen. More complex questions can be asked in a face-to-face interview than in a telephone interview. More questions can be asked in a face-to-face interview since the interview can last up to an hour (optimum time) while 30 minutes is the usual limit for telephone interviews. In comparison with mail questionnaires, face-to-face and telephone interviews are much faster methods of gathering data.

A good preparation for an interview requires several dimensions, such as making sure that interview questions are appropriate (i.e., relevant to the audit), directed to the proper persons, and easily answered.

- **Relevance** requires that interview questions should have a good probability of yielding data needed for the final audit report. Auditors should not go on fishing expeditions and try to include all sorts of variables that can create an unnecessary burden on the interviewee and distract attention from the central purpose of the interview.

- **Selection of respondents.** Consideration should be given to auditees who can be expected to answer given questions. A question may be relevant to a given audit, but the choice of persons to answer it may be inappropriate.

- **Ease of response.** Interviews are meant to obtain data that otherwise may not be documented or, if documented, may need some interpretation. Questions should be constructed that are relatively easy to answer and do not cause undue burden to the interviewee (auditee).

If sensitive questions must be asked, it is best to use a mail questionnaire where confidentiality or anonymity can be granted. In face-to-face interviews, it is wise to avoid questions that

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could cause unnecessary confrontation, causing the interviewer and interviewee to take sides and do battle.

Also to be avoided are questions that have no answers and questions that, if you attempt to ask them, produce unusable results. These are not to be confused with questions for which the legitimate answer might be "no basis to judge" or "no opinion."

(ii) Organizing Interview Questions
The order in which the questions are presented in an interview is important. Early questions, which set the tone for the data collection procedure and can influence responses to later questions, also help the auditor get to know the interviewee and to establish the rapport essential to a successful interview. Remember that the questions should hold the interviewee’s attention; thus, the auditor must begin to introduce some “interesting” questions.

The questions should be presented in a logical manner, keeping the flow of questions in chronological or reverse order, as appropriate. It is good to avoid haphazardly jumping from one topic to another. It is also good to avoid introducing bias in the ordering of questions.

(iii) Interview Design
There are ways to compose good interview questions and to forestall problems with comprehension or bias. The appropriateness and level of language used in the interview, the effects of qualifying language, and the importance of clarity are all important to consider. The auditor needs to be familiar with the various kinds of bias that can creep into the wording of interview questions and their effect on the validity of the audit results (see Exhibit 3.2).

(A) Appropriateness of the Language
Whether interviewing language is appropriate or inappropriate may relate to what is said, how it is said, or when it is said. What is said in the interview is basically dictated by the writer’s structured data collection instrument. How it is said concerns the speech and mannerisms of the interviewer who controls the presentation and whose delivery of questions may alter their intended meaning. When it is said refers to the context of the interview in which each question is placed. If the interviewee expresses concern or sensitivity to a given question, changing the language of a subsequent question might defuse the concern.

(B) Level of Language
When composing interview questions, it is wise to consider the level of the language used. The auditor should seek to communicate at the level the interviewee understands and to create a verbal setting that is conducive to serious data gathering yet one in which the interviewee is comfortable. One problem often encountered is maintaining a level of language that is neither above nor below the interviewee’s level of understanding. Speaking over the

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**EXHIBIT 3.2 Considerations in Designing Interview Questions**

<table>
<thead>
<tr>
<th>Appropriateness of the language</th>
<th>Level of language</th>
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</thead>
<tbody>
<tr>
<td>Speaking down to an interviewee</td>
<td>Use of qualifying language</td>
</tr>
<tr>
<td>Clarity of language</td>
<td></td>
</tr>
</tbody>
</table>
interviewee’s head includes the use of complex, rare, and foreign words and expressions; words of many syllables; abbreviations; acronyms; and certain jargon. Such language, while it may seem appropriate to the interviewer or audit team, may not be understood by the interviewee. Thus, speaking over the interviewee’s head hinders communication. Interviewees who are embarrassed at their lack of understanding may either not answer or guess at the meaning, which can lead to incorrect answers. Or interviewees may get the impression that the auditor really does not care about the answer and lose interest in the interview.

(C) Speaking Down to an Interviewee Speaking down to an interviewee is just as bad as speaking over the interviewee’s head. Oversimplifying the language in the data collection instrument can make interviewees feel that the auditor regards them as ignorant. This approach is demeaning. The auditor has contacted these individuals because they have important information to impart. To treat a person condescendingly—or to let it appear that one does—negates that importance. Likewise, care should be taken in using slang, folksy expressions, and certain jargon. While such language may help the auditor develop rapport with the interviewee, the exactness of the communication may be lessened. To avoid error in either direction, it is useful to pretest both the final wording of the data collection instrument and the interview questions.

(D) Use of Qualifying Language After composing an interview question, the auditor may find it requires an adjective or qualifying phrase or a time specified to make the item complete or to give the interviewee sufficient or complete information. For example, “How many employees do you have?” might become “How many full-time-equivalent employees do you have?” If the auditor did not include the necessary qualifiers in the data collection instrument, another auditor may qualify it in a different way. This could make the resulting data difficult to summarize and analyze. Also interviewees, not realizing that qualifying language is absent, may answer the question as they interpret it. Thus, different interviewees would be responding to different questions, based on their own interpretations.

(E) Clarity of Language The style in which a question is couched can affect the clarity of communication. A question that contains too many ideas or concepts may be too complex for the interviewee to understand, especially if it is presented orally, which makes it difficult for interviewees to review parts of the question. The auditor should limit one thought to one sentence and give the interviewee the proper framework.

Likewise, a sentence may contain clutter—words that do not clarify the message. Questions should be worded concisely. Here are a few suggestions to reduce sentence clutter.

- Delete “that” wherever possible—for example, “Others suggest [that] training can be improved.”
- Use plain language. For example, for “aforementioned,” use “previous” or “previously mentioned.”
- Avoid the passive voice. Substitute pronouns (“I,” “we,” or “they”) and active verbs; instead of “It is necessary to obtain,” use “We need.”

A double-barreled question is a classic example of an unclear question. In this case, it is good to state the question separately if it contains too many parts. In phrasing a question, it is best to avoid the double negative, which is difficult to answer. For example, “Indicate which of the organizational goals listed below are not considered unattainable within the two-year period” should be reworded to read “Indicate which of the organizational goals listed below are considered attainable within the two-year period:”
Words such as “all,” “none,” “everything,” “never,” and others that represent extreme values should be avoided. There are cases when the use of “all” or “none” is appropriate, but they are few. Where “yes” or “no” answers are expected, the results can be misleading. For example, if one employee is not covered in a question such as “Are all of your employees covered by medical insurance,” a “yes” answer is impossible. This is because some employees may not have been covered. A better question would be “About what percentage of your employees are covered by medical insurance?” Where possible, key words and comments used in questions should be defined. For example, when speaking of “employees,” the term should be defined and clarified. Are we talking about part-time, full-time, permanent, temporary, volunteer, white-collar, blue-collar employees?

(iv) Biased Questions in Interviews
A question is biased when it causes interviewees to answer in a way that does not reflect their true positions on an issue. An interviewee may or may not be aware of the bias. Problems result when the interviewees are:

- Unaware of the bias and influenced to respond in the way that is directed by the wording.
- Aware of the bias and either deliberately answer in a way that does not reflect their opinions.
- Refuse to answer because the question is biased.

Bias can appear in the stem (or statement) portion of the question or in the response-alternative portion. Bias may also result when a question carries an implied answer, choices of answer are unequal, “loaded” words are used, or a scaled question is unbalanced.

(v) Conducting Interviews
Each participant in the interview—interviewer (auditor) and interviewee (auditee)—has a role to perform and a set of behaviors that assist in the performance. Because the role and behaviors of each one influence the conduct of the interview, they affect the other participant. To oversimplify, the role of the auditor is to ask the questions; that of the auditee is to respond with answers. Actually, the auditor must perform these major tasks:

- Develop rapport with the auditee and show interest.
- Give the auditee a reason to participate.
- Elicit responsiveness from the auditee.
- Ask questions in a prescribed order and manner.
- Ensure understanding.
- Ensure nonbias.
- Obtain sufficient answers.
- Show sensitivity to the auditee’s burden.

(A) Developing Rapport and Showing Interest  Auditors should seek to establish a balance relationship between the auditee and themselves as empathetic, friendly individuals who are not too different from the auditee but who are also independent, unbiased, and honest collectors of data. The auditors’ appearance, verbal mannerisms, body language, and voice will determine the rapport, starting with the contact that sets up the interview.
Auditors should make their verbal and voice cues calm and unflustered. They should speak so the auditee need not strain to hear and understand. Changes in voice inflection, sighs, or other noises give clues to the auditors’ feelings or moods, as do facial expressions and body language. These nonverbal communications can be imprecise. Auditors should control these so that the auditee does not pick up impatience, disapproval, or other negative feelings. Ideally, auditors should not experience such feelings during the interview, since they are supposed to be impartial, unbiased, and tolerant observers. Likewise, auditors should control expressions of positive feelings or agreement with what the auditee is saying.

It is important that auditors be aware of characteristic nonlinguistic cues, such as change in voice, facial expressions, or gestures, since as much as half of the communication that takes place during the interview is conveyed by these modes of expression. Failure to understand those cues may result in miscommunication.

Auditors’ appearance is still another variable that influence rapport and, therefore, the tone of the interview. Auditors should dress to fit both the interview and the interviewee. This means wearing warehouse-type clothing (e.g., casual) to meet the auditee during physical inventory taken in a warehouse or manufacturing plant and wearing office-type clothing (e.g., suit and tie) to meet an auditee manager in the office. Auditors’ appearance indicates to the auditee that the auditors (1) understand the nature of the auditee’s circumstances and (2) are not totally different from the auditee.

(B) Giving the Auditee a Reason to Participate Some auditees understand the nature of audits in general and the role of the auditor in the organization, while the others do not. Auditees who are not aware of the importance of the audit work and how they can help may not give sincere and well-thought-out answers. Therefore, an auditor’s explanations to the auditee are important to the validity of the resulting data.

(C) Helping the Auditee to Be Responsive Some auditees may have never before been interviewed during an audit. The auditor needs to make the auditee comfortable and capable as a respondent. This can be done by reinforcing the auditee with such verbal cues as “I see,” “Let me get that down,” “I want to make sure that I have that right,” “I see, that is helpful to know,” “It is useful to get your ideas on this.”

(D) Asking Questions in a Prescribed Order and Manner Questions should be ordered so as to lead the auditee through various topics, correctly position sensitive questions, and hold the auditee’s interest. The next suggestions may help.

- Ask the questions exactly as they are worded in the questionnaire.
- Ask the questions in the order in which they are presented in the questionnaire.
- Ask every question specified in the questionnaire.
- Read each question slowly (i.e., two words per second).
- Repeat questions that are misunderstood or misinterpreted.
- Do not let the auditee stray from the questions in the interview.
- Keep nonverbal cues as neutral as possible.

Remember that for telephone interviews, the lack of visual contact decreases the auditor’s ability to make the auditee understand.
(E) Ensuring Understanding  At times, an auditee will not understand a question, as indicated by telling the auditor so, by not answering, or by providing an answer that seems inconsistent or wrong. When this happens, the auditor should use an appropriate probing technique, such as:

- Repeating the question.
- Giving an expectant pause.
- Repeating the respondent’s reply.
- Making neutral questions or comments, such as “Anything else?” “How do you mean?” “What do you mean?”

The auditor should use these probing questions with care so as not to bias the auditee. At this time, rephrasing the question or adding new questions should be avoided as much as possible to minimize confusion.

(F) Ensuring Nonbias  A bias can be introduced in many ways, such as in the way a question is written, in the selection of auditees, in the way the auditor poses the contents of the query, in the introduction of an auditor’s own ideas into a probe, or in the auditor adding certain verbal emphasis or using certain body language. All these can destroy the neutrality that should characterize the auditor’s presentation.

(G) Obtaining Sufficient Answers  Auditors must learn to judge when an answer is sufficient before going to the next question. If the answer is incomplete or vague, auditors should ensure that the question is understood or draw more out of the auditee to complete the answer. Auditors can check the accuracy of the answers given by asking for supporting documentation from the auditee.

(H) Showing Sensitivity to Auditee’s Burden  Before conducting an interview, the auditor should make a general statement regarding how long it is expected to take. Then the auditor is under obligation to adhere to this time limitation. Besides the length of time taken, the interview can be burdensome because of the amount of work the auditee needs to go through to produce the information requested.

(b) Questionnaires

(i) Purpose of Questionnaires  Three phases occur in questionnaires: (1) data design, (2) data collection, and (3) data analysis. A questionnaire is a data collection instrument, and auditors employ it to:

- Ask auditees for figures, statistics, amounts, and other facts.
- Describe conditions and procedures that affect the work, organizations, and systems with which they are involved.
- Obtain from auditees’ their judgments and views about processes, performance, adequacy, efficiency, and effectiveness.
- Report past events and make forecasts.
- Describe auditees’ attitudes and opinions.
- Describe auditees’ behavior and the behavior of others.²

² Ibid.
Questionnaires are popular because they can be a relatively inexpensive way of getting auditees to provide information. However, because questionnaires rely on people to provide answers, a benefit–risk consideration is associated with their use. People with the ability to observe, select, acquire, process, evaluate, interpret, sort, retrieve, and report can be a valuable and versatile source of information under the right circumstances. However, the human mind is a very complex and vulnerable observation instrument. *If we do not ask the right people the right questions in the right way, we will not get high-quality answers.*

**WHAT KINDS OF QUESTIONS SHOULD BE ASKED?**

Three kinds of audit questions should be asked: descriptive, normative, and causal (impact). As the name implies, the answers to **descriptive questions** provide descriptive information about specific conditions or events, and focus on “what is.” An example is the number of people who received certain types of medical benefits in a given year.

The answers to **normative questions** compare an observed outcome to an expected level of performance and focus on “what should be.” An example is the comparison between airline safety violations and the standard that has been set for safety.

The answers to **impact (cause-and-effect) questions** help reveal whether observed conditions or events can be attributed to business operations. An example is determining the effect of changing a policy or a procedure.

Auditors should use these three kinds of questions in questionnaires since they are all relevant to most common audit situations. The best way to achieve the right balance is to see if each question can be labeled as one of the three kinds of questions. If a question does not belong to any of these types of questions, auditors need to decide whether to drop the question or use it as a general background, information-gathering information.

*Questions must be clear, interesting, and easy to understand and answer. The answers to the questionnaires become input to audit report writing.*

**(ii) When to Use Questionnaires**

The decision to use a questionnaire should be made only after carefully considering the comparative advantages and disadvantages of the various ways of administering a questionnaire over other data collection techniques.

Data can be collected in a variety of ways, such as field observations, reviews of records or published reports, interviews, mail questionnaires, and face-to-face or telephone questionnaires. The selection of one technique over another involves trade-offs between staff requirements, costs, time constraints, and, most important, the depth and type of information needed.

Questionnaires are frequently used with sample survey strategies to answer descriptive and normative audit questions. They are often less central in studies answering cause-and-effect questions since good answers require an in-depth qualitative and quantitative analysis. Questionnaires can be used in all types of audits—operational, financial, and compliance—to confirm or expand the audit scope.

Questionnaires can be useful when the auditor needs a cost-effective way to collect a large amount of standardized information, when the information to be collected varies in complexity, when a
large number of auditees are needed, when different populations are involved, and when auditees in those populations are in widely separated locations.

**CONSTRAINTS IN USING QUESTIONNAIRES**

- In using and administering questionnaires, time, cost, and staff expertise are examples of primary constraints while location and facilities are a secondary constraint. For example, if location and facilities are a constraint, use of a mail questionnaire or telephone interviews are advised compared to face-to-face interviews.
- If money is tight and the subject matter can be phrased intelligibly for the respondent population, the mail should be used. Online interviews are becoming popular.
- If time is tight and staff time is not, the face-to-face or telephone interview methods should be used.

Furthermore, questionnaires are usually more versatile than other methods. They can be used to collect more types of information from a wider variety of sources than other methods because they use people, who can report facts, figures, amounts, statistics, dates, attitudes, opinions, experiences, events, assessments, and judgments during a single contact.

Questionnaires are difficult to use if the respondent population cannot be readily identified or if the information being sought is not widely distributed among the population of those who hold the knowledge. Furthermore, questionnaires should not be used if the respondents are likely to be unable or unwilling to answer or to provide accurate and unbiased answers or if the questions are inappropriate or compromising.

In general, questionnaires should not be used to gather information that taxes the limitations of respondents. Sometimes people are not knowledgeable as accurate reporters of certain kinds of information. They remember recent events much better than long-past events. They remember salient and routine events and meaningful facts but do not remember details, dates, and incidental events very well.

Structured questionnaires are also not particularly well suited for broad, global, or exploratory questions. Because respondents have many different forms of reference, levels of knowledge, and question interpretations, the structured methodology limits the auditor’s ability to vary the focus, scope, depth, and direction of the line of inquiry. Such flexibility is necessary to accommodate variances in the respondents’ perceptions and understanding that result from such questions.

Mail questionnaires are usually more cost-effective but require longer time periods than personal or telephone interviews. While mail questionnaires usually have higher development costs than telephone or face-to-face interviews, this is generally offset by the relatively inexpensive data collection costs. Extra care must be taken with the mail questionnaires because, unlike the other choices, there is no interviewer (auditor) to help the respondent (auditee). Also, mail is a slow means of transmission, and mail questionnaires take two or three follow-ups. Online interviews are becoming popular.

If the contacted people are likely to conceal the identity of the intended respondent, and this is likely to make a difference, or if the auditor is not sure that the intended respondent will get the questionnaire, then personal contact is better than telephone and telephone is better than mail.
Before preparing the questionnaire, auditors need to choose the format for each question, which is a design issue. Basically, two types of formats exist: open-ended and closed-ended questions (see Exhibit 3.3).

Open-ended questions are easy to write and require very little knowledge of the subject or operation. These types of questions provide very unstandardized, often incomplete, and ambiguous answers, and it is very difficult to use such answers in a quantitative analysis. Respondents will write some salient factors that they happen to think of but will leave out some important factors because they did not think of them at that moment.

Open-ended questions do not help respondents consider a range of factors; rather, they depend on the respondents’ unaided recall. There is no way of knowing what is important but not recalled, and because not all respondents consider the same set of factors, it may be extremely difficult or impossible to aggregate the responses. Open-ended questions are easy for auditors and difficult for auditees.
Also, auditors may not know how to interpret the answers due to their descriptive nature. Another problem is that open-ended questions cannot easily be tabulated. Rather, a complicated process called content analysis must be used, in which someone reads and rereads a substantial number of the written responses, identifies the major categories of themes, and develops rules for assigning responses to these categories.

Still another problem is that open-ended questions substantially increase response burden. They usually take several minutes to answer rather than a few seconds. Because respondents must compose and organize their thoughts and then try to express them in concise language, they are much less likely to answer such questions.

However, open-ended questions sometimes do have advantages. Their use may be unavoidable when, for example, auditors are uncertain about criteria or are engaged in exploratory work. If auditors ask enough people an open-ended question, a list of alternatives for closed-ended questions can be developed, but not the other way around. Auditors can also use open-ended questions to make sure the list of structured alternatives does not omit an important item or qualification. Auditors can also ask open-ended questions to obtain responses that might further clarify the meaning of answers to closed-ended questions or to gather respondent examples that can be used to illustrate points. In other words, answers to open-ended questions can become an input to the closed-ended questions.

(v) Closed-Ended Questions
Yes/no questions are very popular. Although they have some advantages, they have many problems and few uses. Yes/no questions are ideal for dichotomous variables, such as black and white, because they measure whether the condition or trait is present or absent. They are therefore very good for filters in the line of questioning and can be used to move respondents to the questions that apply to them.

**Yes/No Filter Question**
Did you get training? (Check one)
- Yes (continue)
- No (go to question 5)

Consider the question: “Were the terms of the contracts clear?” Most auditees would have trouble with this question because it involves several different considerations: (1) Some contracts may have been clear and others may not have been; (2) some contracts may have been neither clear nor unclear or of marginal clarity; (3) parts of some contracts may have been clear and others not clear.

**WHEN TO USE YES/NO QUESTIONS**
Yes/no questions are good in dealing with measures that are absolute. They are not good for measures that span a range of values and conditions.

Because so little information is obtained from each yes/no question, several rounds of questions individually have to be administered to get the information needed. “Did you have a plan?” “Was the plan in writing?” “Was it a formal plan?” “Was it approved?” This method of inquiry is usually so boring as to discourage respondents.
Sometimes question writers try to compress their line of inquiry and cause serious item-construction flaws. They ask for two things at once—a double-barreled question. For instance, a yes/no answer to “Did you get mission and site support training?” is imprecise. How do respondents answer if they got mission but not site support training? A related question-writing mistake is mixing yes/no and multiple choice.

Yes/no questions are prone to bias and misinterpretation for two reasons:

1. Many people like to say “yes.” Some have the opposite bias and like to say “no.”
2. Questions such as “Do you submit reports?” have what is called an “inferred bias” toward the “yes” response. The most common way to counter this bias is to add the negative alternative—for example, “Do you submit reports or not?” However, if this is done, the use of yes/no choices in the answer must be qualified or avoided. Without this precaution, a simple “yes” answer may be read as applying to both parts of the question: “Yes, I submit” and “Yes, I do not submit.” A simple “no” might also be read as “No, I do not submit”—a double negative. To prevent confusion, answer choices should be qualified to avoid yes/no answers.

### Balanced and Unambiguous Yes/No Question

Do you submit reports? (Check one)

- Yes, I submit reports
- No, I do not submit reports

(A) “Implied-No” Choices

The implied-no choice format, a variation of yes/no format, is used because it is easy to read and quick to answer. A failure to check an item implies “no.” When auditors want to emphasize the “no” alternative, they can expand the implied-no format to include one column for “yes” answer and one for “no.” If “no” is not included as an alternative, noes will be overreported, because the auditors will not be able to differentiate real noes from omissions and nonresponses.

(B) Single-Item Choices

In single-item choices, which is another variation of the yes/no format, respondents choose not “yes” or “no” but one of two or more alternatives. This is because “yes” and “no” are not one of the choices given. Since yes/no and single-item choices are similar, they have the same types of problems, but the difficulties are less pronounced in some respects and accentuated in others.

If used carefully, the single-item choice can be efficient. It often serves to filter out people or to skip them through parts of the questionnaire. It is not likely to be overused and cause excessive cycles of repetition. Furthermore, the question writer is not likely to compress the question into a double-barreled item. The single-item-choice format is also not subject to bias from yea-sayers or naysayers, and eliminating the negative alternative reduces misinterpretation.

But there are problems. In the single-item choice format, the writer is more apt to bias one of the choices by understating or overstating it. Some writers may not properly emphasize the second alternative; others, aware of this tendency, overcompensate.

(C) Expanded Yes/No Questions

One way around the yes/no constraints is to use an expanded yes/no format. The expanded yes/no format gives: a measure of intensity; avoids some of the biases
common to yes/no, implied-no, and single-item-choice questions; and resolves the problem of quibbling.

*Expanded Yes/No Format*

- Yes
- Probably yes
- Probably no
- No

The expanded alternatives can have qualifiers other than “probably yes” and “probably no.” Qualifiers can be changed to meet the situation—“generally yes” and “generally no” or “for the most part yes” and “for the most part no.”

**(D) Multiple-Choice Questions** The most efficient format—and the most difficult to design—is the multiple-choice question. The respondent is exposed to a range of choices and must pick one or more. Usually four or five choices are included, the “other—specify” being the final choice.

Multiple-choice questions are difficult to write because the writer must provide a comprehensive range of nonoverlapping choices. They must be a logical and reasonable grouping of the types of experience the respondents are likely to have encountered.

**(E) Free-Choice Questions** Yes/no, implied-no, single-item, and expanded formats are forced choices in that respondents must answer one way or the other. Forced-choice items generally simplify measurement and analysis because they divide the population clearly into those who do and those who do not or those who have and those who have not. Unfortunately, putting the population into just two categories may also oversimplify the picture and yield error, bias, and unreliable answers. To avoid this problem and to reduce the respondent’s burden, a middle category can be added.

*Expanded Yes/No Format with Middle Category*

- Yes
- Probably yes
- Uncertain
- Probably no
- No

Even though the proportion of yesses to noes will not change, the auditor will have a better measure of the yes/no polarization, because the middle category absorbs those who are uncertain. A good rule of thumb is that if we are not certain that nearly everyone can make a clear choice, we include a middle category.

Usually the question writer will also put in an escape choice to filter out those for whom the question is not relevant. Examples are “not applicable,” “no basis to judge,” “have not considered the issue,” and “can’t recall.”
(F) Fill-in-the-Blank Questions  Each questionnaire usually has some fill-in-the-blank questions. They are not open-ended because the blanks are accompanied by parenthetical directions that specify the units in which the respondent is to answer.

<table>
<thead>
<tr>
<th>Fill-in-the-Blank Questions</th>
</tr>
</thead>
<tbody>
<tr>
<td>What size is your manufacturing plant? _______________ (in square feet)</td>
</tr>
<tr>
<td>What is your department budget? ________________ (in dollars)</td>
</tr>
</tbody>
</table>

Fill-in-the-blank questions should be reserved for very specific requests. The instructions should be explicit and should specify the answer units. Sometimes several fill-in-the-blank questions are asked at once in a row, column, or matrix format.

(vi) Quality of Questionnaires  The quality of questionnaires can be checked by several methods, some of which are carried out during the design phase and others during the data collection or analysis phase. During the design phase, the questionnaire should be pretested (or pilot tested) on selected persons or departments that represent the range of conditions likely to influence the auditor’s results. The questionnaires should also be sent out for review by experts who are familiar with both the issue area and the respondent group. In addition to expert reviews, peer reviews can be done by an auditor who worked on the auditable area before or a new auditor who never worked before in that area.

QUALITY ASSURANCE OF QUESTIONNAIRES  The quality of questionnaires can be checked by four methods:

1. Pretesting
2. Expert review
3. Peer review
4. Validation and verification techniques

The first three methods belong to the data design phase, while the fourth method is used in the data collection and data analysis phases.

Pretesting and expert review are some of the best ways to ensure that the instrument actually communicates what it was intended to communicate, that it is standardized and will be uniformly interpreted by the target population, and that it will be free of design flaws that could lead to inaccurate answers.

Important parts of quality assurance effort are validating, verifying, or corroborating responses; conducting reliability studies; and analyzing nonresponses. These tasks are conducted during the data collection and analysis phases.
(vii) Pretesting
By testing the questionnaire before it is distributed, auditors can assess whether they are asking the right group of auditees the right questions in the right way and whether the respondents are willing and able to supply the information the auditors need. Pretests are conducted with a small set of respondents from the population that eventually will be considered for the full-scale study. Troublesome questions discovered in the pretest can be dropped.

Mail questionnaires are pretested by means of personal interviews. During the interviews, a wealth of information can be obtained by observing respondents as they complete the form and by debriefing them about the question-answering experience. The purpose of debriefing is not only to identify items that are difficult or misunderstood but also to get at the cause of these problems.

(viii) Expert Review
Expert review seeks outside comments on the questionnaire approach. The purpose of this expert review is twofold: (1) to determine whether the questions and the manner in which they are asked are adequate for addressing the larger questions posed by the audit; and (2) to find out whether the target population for the survey has the knowledge to answer the questions. People who provide expert reviews do not act as pretest interviewees; they do not answer the questions but provide a critique. Some sources of expert reviews include audit managers from the same or other business units or divisions, auditee managers, and business school professors.

(ix) Data Validation, Verification, Corroboration, and Reliability of Questionnaires
Validation is an effort to ensure that the questionnaire is actually measuring the variables it was designed to measure. The concept of construct validation requires the demonstration of the relationship between the measurement and the construct being measured in a setting as controlled as possible. Construct validity is tested with a number of people under controlled conditions. A very practical method of assessing validity is to use content validity. In this approach, auditors might ask experts to make sure that the measure includes the content they want to measure. Validity can be tested by looking at the relationships between factors that should be positively correlated or negatively correlated. For example, measures of the quality of training ought to correlate positively with productivity. If they do, we have some confidence in the validity of the measures. The measure of a participative management style ought to correlate inversely with a measure of an authoritative management style. If it does, confidence in the validity of the measure is strengthened.

<table>
<thead>
<tr>
<th>CRITERIA FOR QUESTIONNAIRES</th>
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<tbody>
<tr>
<td>The term “validation” refers to the purpose of measure (shows that the observation measures what it is supposed to measure).</td>
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<tr>
<td>The term “verification” refers to the accuracy of data.</td>
</tr>
<tr>
<td>The term “corroboration” refers to validation in some cases.</td>
</tr>
<tr>
<td>The term “reliability” refers to the consistency of measures.</td>
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</table>

Validation is important because if the questions are not valid measures of the constructs being studied, even answers verified as accurate will not provide the quality data needed for findings, conclusions, and recommendations.
**Verification** is a way of checking or testing questionnaire answers with records or direct observation to reduce the risk of using data that are inaccurate. The accuracy of data is tested by comparing the data against an accurate source, by putting in controls that reduce observation errors, or by repeating the measurement process. The extent of verification should be based on the type of data, their use as evidence to address the assignment’s objectives, the relative risk of the data being erroneous, and an alternative available to verify data, including time and resource constraints.

The most convincing method of verification is to compare on a test basis the respondent’s answers with evidence developed from an on-site inspection that involves direct observation or a review of documents and records. Ideally, such verifications are conducted on a statistical sample of the respondent population. Practically, a judgment sample considered typical of the population is often used.

<table>
<thead>
<tr>
<th>VERIFICATIONS VERSUS VALIDATION</th>
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<tbody>
<tr>
<td>Verification is different from validation.</td>
</tr>
<tr>
<td>Ideally verification is conducted by testing a sample, which is time consuming and expensive.</td>
</tr>
<tr>
<td>Validation does not require sampling approaches.</td>
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</table>

**Corroboration** (referred to as validation in some circumstances) of questionnaire results against similar information from another, independent source can also provide supporting evidence to increase confidence in the relative accuracy of questionnaire data.

The **reliability** of questionnaire results tests whether a question always gets the same results when repeated under similar conditions. **Answers can be highly reliable without being either verified or valid.** A reliable measure is one that, used repeatedly in order to make observations, produces consistent results. Testing reliability is difficult and expensive, because auditors have to either replicate the data collection or return to those who were questioned before. People do not like to be retested.

<table>
<thead>
<tr>
<th>VERIFICATION VERSUS RELIABILITY</th>
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<tbody>
<tr>
<td>The procedures for testing the reliability of answers are different from those for verifying answers.</td>
</tr>
<tr>
<td>When information is verified, auditors usually go to a different source for the same information or use a different technique on the same source, such as observations or in-depth interviews.</td>
</tr>
<tr>
<td>To test reliability, auditors have to administer the same test to the same source.</td>
</tr>
</tbody>
</table>

Why do auditors have to validate, verify, corroborate, and make reliability checks during data collection or analysis phases? Nonstandardized questionnaires require this kind of checking. Auditors are either measuring things that have not been measured before or measuring previously measured things under different circumstances. Standardized questionnaires have already been tested during their design and development phase.

**Analysis of Questionnaire Nonresponses**

Nonresponses to questionnaires, whether an individual item or a section that is not completed, must be analyzed because high or disproportionate nonresponse rates can threaten the credibility
and generalizability of the findings. The real problem is not so much the decreased sample size but whether those who chose not to answer had disproportionately different views from those who did. This would threaten the representativeness of the sample and the ability to generalize from the sample to the population. Inductive generalizations cannot be made under these circumstances. Therefore, reasons for nonresponses should be investigated.

(xi) Quality Instructions for Questionnaires

A questionnaire should be easy to read, attractive, and interesting. Good graphics and layout can catch the respondent’s attention, counteract negative impressions, cut the answer time in half, and reduce completion errors.

The first part of the questionnaire should present the introduction and instructions. The instructions should:

- State the purpose of the survey.
- Explain who the data collector is, the basis of its authority, and why it is conducting the survey.
- Tell how and why the respondents were selected.
- Explain why their answers are important.
- Tell how to complete the form.
- Provide mail-back instructions.
- List the person to call if help is needed to complete the form.
- Provide assurances of confidentiality and anonymity when appropriate.
- Tell how long it will typically take to complete the form.
- Explain how the data will be used.
- Explain who will have access to the information.
- Disclose data uses that may affect the respondents.
- Present the response efforts as a favor and thank the respondents for their cooperation.

The instructions should be concise, courteous, and businesslike.

(xii) Use of Rating Scales for Questionnaires

Questions are subject to ranking and rating. Ranking questions are used to make very difficult distinctions between things that are of nearly equal value. The question forces the respondent to value one alternative over another no matter how close they are. The value that is assigned is a relative value. Rating questions are used when the alternatives are likely to vary somewhat in value and when auditors want to know how valuable the alternative is rather than if it is a little more or less valuable than the next alternative. The next list discusses ranking and rating.

- **Ranking.** In ranking, the respondents are asked to tell which alternative has the highest value, which has the second highest, and so on. They rank the choices with respect to one another, but their answers tell little about the intrinsic value of their choices. Ranking starts to get hard for people when there are more than seven categories. Respondents begin to
lose track of where they are with respect to the first, last, and middle positions. When this happens, they make mistakes. Ranking questions have to be written very carefully. The slightest lapse in clarity in the question or the instruction given will cause some people to rank in the reverse order or to assign two alternatives the same rank or to forget to rank every alternative. Nonetheless, sometimes ranking must be used, as when an order of issues or items is important.

- **Rating.** Rating questions are perhaps the most useful format because we usually want to know the actual or absolute value of the trait we are measuring. Ratings are assigned solely on the basis of the score’s absolute position within a range of possible values. For example, a rating scale might be assigned these categories: of little importance, somewhat important, moderately important, and so on. In writing rating questions, it is useful to categorize the scales in equal intervals and anchor the scale positions whenever possible. Aside from the scaling, rating questions are easier to write properly and cause less error than ranking questions. Ratings usually provide an adequate level of quantification for most purposes, and rating formats are simpler than ranking formats.

### Examples of a Rating Question

Based on what we discussed, how would you classify the risk involved in your accounts receivable operations? (Check one)

- Maximum risk
- Moderate risk
- Minimum risk
- No risk

Other question formats include the Gutman format and intensity scale format, where the latter includes the Likert scale and amount and frequency intensity scales. In questions written in the **Gutman format,** the alternatives increase in comprehensiveness; that is, the higher-valued alternatives include the lower-valued alternatives. The intensity scale format is usually used to measure the strength of an attitude or an opinion.

Another frequently used intensity scale format is the **Likert or agree-or-disagree scale.** The Likert scale is easy to construct. However, if the writer is not careful, the simplicity and adaptability of the Likert scale format are often paid for by greater error and threats to validity.

Consider an example of the Likert scale: “My supervisor never lets me participate in decisions (agree or disagree).” First, there is bias. The Likert scale presents only one side of an argument, and some people have a natural tendency to agree with the status quo or the argument presented. This bias can be countered by presenting the converse statement also: “My supervisor lets me participate in decisions (agree or disagree).”

Another problem is that the extent of the respondent’s agreement or disagreement with a statement may not correspond directly to the strength of the respondent’s attitude about the Likert statement posed in the question. The respondent may consider the statement either true or false and respond as if the question were in an either/or format rather than a graduated scale measuring the intensity of a belief.

The Likert question uses the statement as a reference point or anchor. Hence, what is measured may be not the strength of the respondent’s attitude over the complete range of intensities but
rather the range of intensities bounded or referenced by the position of the anchoring statement at one end of the range and unbounded at the other end of the range. The indirect approach in the Likert scale may produce misleading results for a variety of reasons. It is usually better to use a direct approach that measures the strength of the respondent’s actual attitude over a complete range of intensities. For example, it is better to reformulate the item from “My supervisor never lets me participate in decisions” to “To what extent, if at all, do you participate in decisions?”

However, one situation in which the Likert scale is very useful is when the extent of an agreement or disagreement is closely and indirectly related to the statement. For instance, the respondent may be asked about the extent to which he or she agrees or disagrees with a policy.

**Example of a Likert Scale Question**

How do you feel about policy A? (Check one)

- ☐ Strongly agree
- ☐ Agree more than disagree
- ☐ Undecided
- ☐ Disagree more than agree
- ☐ Strongly disagree

Many audit questions ask the respondent to “quantify” either amounts or frequencies. These questions are relatively simple. They use certain derivative words to characterize the amount, frequency, or number of items being measured. For example, traits like “help,” “hindrance,” “effect,” “increase,” or “decrease,” can be quantified by adding “little,” “some,” “moderate,” “great,” or “very great.” Certain adjectives, such as “some” and “great,” have a stable and relatively precise level of quantification. Quantities can also be implied by the sequence of numbered alternatives ordered with respect to increasing or decreasing intensity.

**Examples of Amount Intensity Scale**

- ☐ Little or no hindrance
- ☐ Some hindrance
- ☐ Moderate hindrance
- ☐ Great hindrance
- ☐ Very great hindrance

Frequencies or occurrences of events are treated the same way. Question writers know that words like “sometimes,” “great many,” or “very often” mean about one-fourth of the amount or 25% of the time and three-fourths or 75% of the time, respectively, to most people. Similarly, “about half” and “moderate” anchor the midpoints. As with amount intensity scales, it is important to use both numbered, ordered scalar presentations and words to quantify the scale intervals.

**Examples of Frequency Intensity Scale**

- ☐ Seldom if ever
- ☐ Sometimes
- ☐ Often
- ☐ Very often
- ☐ Always or almost always
In many amount and frequency measures, where ambiguities are likely to occur, it is also important to use proportional anchors, such as fractions and percents, or verbal descriptive anchors, such as once a day or once a month, in addition to the adjective and scale number anchors.

**Examples of Frequency Intensity Scale with Proportional Anchors**

- Seldom if ever (0 to 10% of the time)
- Sometimes (about one quarter of the time)
- Often (about one half of the time)
- Very often (about three quarters of the time)
- Always or almost always (90 to 100% of the time)

(xiii) Application of Rating Scales

Rating scales can be applied in many instances. For example, rating scales can be used as a method of employee performance evaluation. In the graphic rating scale method, a set of performance factors, such as quantity and quality of work, depth of knowledge, cooperation, and initiative, can be used to rate each factor on an incremental scale of 1 (poor) to 5 (excellent). Advantages of rating scales are that they are less time consuming to develop and administer and allow for quantitative analysis and comparisons. The disadvantage is a lack of depth of information on the performance factors when compared to anecdotal records (discussed below).

Behavioral anchored rating scales combine major elements from the anecdotal records and graphic rating scale approaches. Examples of behavioral descriptions that are used to rate include “plans,” “anticipates,” “executes,” and “solves problems.” The appraiser rates the employee based on actual behavior on the job rather than general descriptions or traits.

(xiv) Methods for Gathering Feedback

Auditors face some degree of nonrespondent problem whether they are conducting personal interviews or mailing questionnaires. The reason is that auditees may not be available, may be unable to locate, or do not answer the questions completely or sufficiently. In some cases, auditors may want to obtain feedback on the quality and relevancy of interview or the questionnaire. The higher the nonrespondent problem, the lower the feedback.

The best approach to gather feedback would be to conduct a short phone survey of auditees, using some of the critical questions on the data collection instrument, or second-mail the questionnaire.

Some other common methods for gathering feedback include sending standardized letters for comments, requesting customized written responses, receiving voice mail answers, and receiving electronic mail answers. A stratified sample can be selected to determine the number of auditees to request for feedback.

(c) Checklists

Auditors are familiar with using checklists for various purposes. They are memory aids to ensure that all required steps or actions are completed. Checklists can be used in any phase of the audit: planning, survey, fieldwork, report writing. Checklists are especially useful during
Supervisors can use checklists to document their review comments when they look at the auditor’s working papers. Supervisors can later use the review comment sheet (also called point sheet) for follow-up to ensure that all points that were raised are cleared by the auditor who worked on the audit. There is no limit to the number of applications of the checklists, and it really depends on the creativity of the auditor. Audit quality can be enhanced with the use of checklists since they provide a discipline and framework to work with by all parties involved in an audit. For example, checklists can be used during a peer review of working papers to mark compliance with the requirements.

(d) Focus Groups

(i) Purpose of Focus Groups
The primary purpose of focus groups is to collect qualitative data, with quantitative data being the secondary purpose. Focus groups do represent an important tool for discovery and exploration of ideas and opinions. They are a choice between individual interviews or focus group interviews. Focus groups, which consist of 6 to 12 people, produce a rich body of data expressed in the respondents’ own words and context.

Surveys ask for responses expressed on point rating scale or other constrained response categories. Surveys produce more artificial responses than focus groups due to absence of interaction among respondents. The data provided by focus groups are idiosyncratic and difficult to summarize. In surveys, the response categories may or may not be those with which the respondents are comfortable, although they may still be selecting answers.

KEY CONCEPTS TO REMEMBER: Questionnaires

- The primary purpose of an internal control questionnaire (ICQ) is to make preliminary appraisals of controls to be tested.
- The primary advantage of using an ICQ is that it reduces the risk of overlooking important aspects of the system.
- The major disadvantage of using an ICQ is that questionnaires may be completed routinely by users without auditors really understanding overall operations of internal control systems.
- ICQ provides indirect audit evidence that might need corroboration. The verification technique is most appropriate for testing the quality of the preaudit of payment vouchers described in an ICQ.
- The most appropriate use of questionnaires is to help review internal control.
- The ICQ does not highlight the interaction of departments; it is a static data collection instrument.

SURVEY VERSUS FOCUS GROUP

- Surveys produce artificial responses due to lack of interaction among respondents.
- Due to interaction among respondents, focus groups do not produce artificial responses.
(ii) The Process
The process begins with a statement of the problem. The group has focus and a clearly identifiable agenda. Then a sampling frame is identified. A moderator needs to be located to design the questions used in the group interview. The moderator leads the group through the questions and seeks to facilitate discussion among all the group members. The moderator should be perceived as nonevaluative and nonthreatening. Analysis and interpretation of data and report writing concludes the process.

(iii) Uses and Misuses
Focus group interviews should be considered when these circumstances are present:

- Insights are needed in exploratory or preliminary studies, with limited scope or limited resources. The goal might be to gain reactions to areas needing improvement.
- There is a communication or understanding gap between groups or categories of people. Focus groups bring people together.
- The moderator desires ideas to emerge from the group. Focus groups possess the capacity to become more than the sum of their participants, to exhibit a synergy that individuals alone cannot achieve.

Focus group interviews should not be considered when these circumstances are present:

- The environment is emotionally charged, issues are polarized, trust had deteriorated, and the participants are in a confrontational mode.
- The moderator has lost control over critical aspects of the study. The moderator should maintain control over the selection of participants, question development, and analysis protocol.
- Statistical projections or estimations are needed. Focus groups do not involve sufficient number of participants, nor does the sampling strategy lend itself to statistical projections. The types of generalizations that arise from focus group results tend to be more general than specific, more tentative, and more descriptive.

(iv) Advantages and Disadvantages of Focus Groups
Some major advantages resulting from focus groups include:

- Focus groups provide data from a group of individuals much more quickly and at less cost than would be the case if each individual were interviewed separately. They also can be assembled on much shorter notice than would be required for a more systematic and larger survey.
- The focus group interview process is objective and rigorous as it rests on an extensive body of empirical theory and research as well practice.
- Focus groups allow the moderator to interact directly with respondents. This provides opportunities for the clarification of responses, for follow-up questions, and for the probing of responses. Respondents can qualify responses or give contingent answers to questions. In addition, it is possible for the moderator to observe nonverbal responses, such as gestures, smiles, frowns, and so forth.
- The open response format provides an opportunity to obtain large and rich amounts of data in the respondents’ own words. It allows respondents to react to and build on the responses of other group members.
Some major disadvantages resulting from the focus groups include:

- The results obtained in a focus group may be biased by a very dominant or highly opinionated member of the group. More reserved group members may be hesitant to talk.
- The open-ended nature of responses obtained in focus groups often makes summarization and interpretation of results difficult.
- The moderator may bias results by knowingly or unknowingly providing cues about what types of responses and answers are desirable.
- Each focus group really represents a single observation, although it is a group of people. Group consensus is given here. Therefore, more than one focus group should be conducted on a specific topic.

(v) Audit Application of Focus Groups

Focus groups can be used in the survey phase of an audit when little is known about the area to be audited. For example, they can be used to obtain general background information about an area; to diagnose the potential for problems with a new policy, program, product, or service; to generate impressions of policies, products, programs, or services; and to interpret previously obtained quantitative data through mail surveys.

(e) Observations

Observation is a direct notice of things, events, and people’s actions. It is the ability to see what is happening in an individual and/or within a group and to respond appropriately. Watching body language in addition to words and actions is an additional benefit of observation. In other words, body language says more than the words and actions of people.

Observation is considered a reliable audit procedure but one that is limited in usefulness. It is not sufficient to satisfy any audit assertion other than existence. Observation provides information on how transactions are handled at one particular point in time, not how they are processed throughout the period under study. It provides a snapshot of operations. The reason why observation is limited is that individuals can react differently when being observed.

(f) Unobtrusive Measures

An unobtrusive measure is the one that is not readily noticeable to others. An auditor can use an unobtrusive measure, for example, to check to see if all hourly employees in a manufacturing plant are clocking in when they report to their workstation, as opposed to someone else clocking in for them. An auditor would stay unobtrusively in an area where employees clock in to determine their natural motions and actions. Compliance with procedure is the auditor’s major objective here.

Another application is to determine whether security guards at a retail store are checking all bags and personal belongings of all employees when they leave the store building. An auditor would observe this in an unobtrusive manner so that the security guard would not notice him or her. It is a test of control compliance with the store policy that all employee bags are checked every day at quitting time.

(g) Anecdotal Records

Anecdotal records constitute a description or narrative of a specific situation or condition. For example, during the employee performance evaluation process, the appraiser writes down anecdotes
that describe what the employee did that was especially effective or ineffective. The appraiser can be the immediate supervisor, peers, self-evaluation by the employee, or immediate subordinate(s).

Another example of use of anecdotal records is allowing a fraud suspect to make a narrative response concerning the incident after the interviewer has established rapport and sold the suspect on the need to cooperate in the interview.

(h) Nonstatistical Sampling Method

This section discusses sampling theory, sampling plan and operations, and the similarities and differences between statistical sampling and nonstatistical (judgmental) sampling.

(i) Sampling Theory

The primary reason for an auditor to use statistical sampling is to allow him or her to quantify, and therefore control, the risk of making an incorrect decision based on sample evidence. Statistical sampling does not prevent auditors from using professional judgment in conducting reviews. Statistical sampling is merely a tool to help them make wise decisions. Auditors still decide what type of review to make, how and when to use sampling, and how to interpret the results. In applying statistical sampling techniques to audit testing, auditors must make six decisions that involve professional judgment.

1. **Auditors must define the problem.** They must decide what to measure, what type of information will provide sufficient facts for the formation of an opinion, and what testing procedures to use.

2. **They must specify the level of confidence.** This is precision, or the probability that an estimate made from the sample will fall within a stated interval of the true value for the population as a whole. Auditors may think of it as the percentage of times that a correct decision (within the specified precision limits) will result from using an estimate based on a sample.

3. **Auditors must define the population for size and other characteristics.** They decide what type of items will be included and excluded, and specify the time period to be covered.

4. **They must determine the areas applicable to sampling.** The auditors’ assessment of the internal control system for an area may determine whether statistical sampling is appropriate. A strong internal control system may reduce testing to the minimum necessary for verification and may therefore call for a different sampling plan or no statistical sampling at all. Prior experience, as well as information from prior audits, plays a role here. Prior audits may suggest that certain kinds of records are more prone to error and need higher verification rates than other kinds of records. Thus, auditors may have to stratify the population between records likely to have a high error rate and those likely to have a low error rate.

5. **Auditors must decide the maximum error rate that they will consider acceptable, and they must define an error.** Or, if auditors are attempting to estimate the value of some balance sheet amount, they must determine the required precision of the estimate in terms of the materiality of the amount being examined and the overall objective.

6. **They must draw conclusions about the population from the sampling results.** In arriving at these conclusions, auditors must judge the significance of the errors they have discovered.
Because statistical sampling provides more and better information than guesswork, it permits greater use of professional judgment and enables auditors to analyze the results of tests more effectively. And by reducing the workload, statistical sampling allows auditors more time to use professional judgment.

Basically there are two approaches to audit sampling: (1) statistical and (2) nonstatistical. The choice is based on costs and benefits. Sampling risk—the risk that the sample is not a representative of the population—is present in both approaches.

(ii) Sampling Plan and Operations
Topics covered include in sampling, sampling operations, sample size, precision, and confidence, and types of risks.

(A) Sampling Plan When designing a sampling plan, auditors should keep in mind the desirability of obtaining a sample that is as representative, corrective, protective, and preventive as possible. To do so, they should stratify the population on the basis of dollar value and the likelihood that the items contain errors, use some random method to select the sample from each stratum, and weight the results from each stratum to compute overall estimates for the population. It is not possible, however, to optimize all four characteristics in a single sample. Instead, a balance must be struck, depending on which characteristic is most important in view of the audit objective. Also, in certain types of audits, one or more of the characteristics may not require consideration at all.

One of the auditor’s objectives is to answer questions about a universe of people or things. This universe is called the population. This objective can be achieved by looking at a sample of things, if the sample is representative of the population. A representative sample has approximately the same distribution of characteristics as the population from which it was drawn.

(B) Sampling Operations There are three components in the sampling operations: (1) sample design, (2) sample selection procedures, and (3) estimation procedures. The term “sample design” refers to the plans made for the overall way in which a sample will be related to a population. Selection procedures are the methods used to select units of samples from a population. Estimation
procedures are the ways of estimating the characteristics of a population from information acquired about a sample.

Interrelationships exist among these three components:

1. The sample design will affect the estimation procedures to be used, and it may also affect the selection procedures. Conversely, the sample design is often affected by the estimation procedures to be used.

2. Selection procedures can have a major effect on how precision is estimated.

3. The types of estimates to be developed can have a bearing on the selection procedures to be used.

Auditors usually form conclusions through testing, or “sampling,” a portion of a collection of items from a population. The method by which they choose a sample and the degree to which the sample is representative of every item in the population determine whether auditors can form valid conclusions based on testing results.

(C) Sample Size  The determination of an appropriate sample size is part of sample design. Before selecting the sample size, the auditor should decide on the sampling method to be used, the estimation procedure, the sample precision required, and the confidence level desired.

If all other factors in a sampling plan are held constant: (1) changing the measure of tolerable error to a smaller value would cause the sample size to be larger, or (2) changing the audit risk from 5% to 3% would cause the sample size to be larger.
(D) Precision  Specifying the precision needed for sample estimates is an important part of sample design. The desired precision is the amount of sampling error that can be tolerated but that still permits the results to be useful. It is sometimes called tolerable error or the bound on error. In terms of a stated confidence level, precision is the range into which an estimate of a population characteristic is expected to fall. Factors in the choice of a desired precision include the tolerable level of sampling error, the size of an account balance error considered material, and the objectives of the audit test being conducted. Audit resources available for execution of the sampling plan are not a factor.
Consider this application of precision: Based on a random sample, it is estimated that 4%, plus or minus 2%, of a firm’s invoices contain errors. The plus or minus 2% is known as the estimate’s precision.

PRECISION VERSUS SAMPLING RISK
- Precision is under the auditor’s full control because he or she specifies it.
- Sampling risk is not under the auditor’s full control.
- Precision applies to both attributes sampling and variables sampling.
- Sampling risk is present in both attribute sampling and variables sampling work.

(E) Precision and Confidence  Because precision is a way of expressing the amount of error that can be tolerated, it is related to the accounting concept of materiality. Materiality, or importance, is a relative concept rather than an absolute one. For example, a $100,000 overstatement of the assets for a company whose total assets are only $200,000 would be material while it would be immaterial for a company with total assets of multibillions of dollars.

In addition to specifying the precision of the estimate, auditors must specify the degree of confidence that they want placed in the estimate. This is referred to as confidence level, expressed as a percentage. Confidence level is the complement of the chance that our estimate and its precision will not contain the true but unknown population value. The confidence level should be determined by the importance of the sample results to the overall objectives of the audit.
Two examples will illustrate the relationship between confidence level and risk.

1. A confidence level of 90% means that there are 90 chances out of 100 that the sample results will not vary from the true characteristics of the population by more than specified amount.

2. The complement of the risk that an internal auditor will erroneously conclude adequate compliance with a specific management policy is the confidence level.

**PRECISION VERSUS ACCURACY**

- “Precision” refers to the maximum amount, stated at a certain confidence level, that we can expect the estimate from a single sample to deviate from the results obtained by applying the same measuring procedures to all the items in the population.

- “Accuracy” refers to the difference between the value of the population from which the sample is selected and the true characteristic that we intend to measure.

**(F) Types of Risks**

Basically, there are two types of risks: (1) sampling and (2) nonsampling risks. **Sampling risk** is the risk that the conclusions reached based on a sample will differ from those conclusions that would be reached by examining the entire population. Usually, the smaller the sample size, the greater will be the sampling risk.

**Nonsampling risk** arises even if the entire population is tested and is due to errors in auditor judgment, such as use of inappropriate audit procedures and not recognizing errors during sampling. This risk can be controlled with better audit planning and supervision.

The American Institute of Certified Public Accountants in its Statement on Auditing Standards (SAS) 39 describes the two aspects of sampling risk in performing substantive testing.

1. The **risk of incorrect rejection** is the risk that the sample supports the conclusion that the recorded account balance is materially misstated when it is not materially misstated. This is known as *alpha risk*, Type I error.

2. The **risk of incorrect acceptance** is the risk that the sample supports the conclusion that the recorded account balance is not materially misstated when it is materially misstated. This is known as *beta risk*, Type II error.

According to SAS 39, the auditor is also concerned with two aspects of sampling risk in performing compliance tests of internal accounting control.

1. The **risk of overreliance** on internal accounting control is the risk that the sample supports the auditor’s planned degree of reliance on the control when the true compliance rate does not justify such reliance.

2. The **risk of underreliance** on internal accounting control is the risk that the sample does not support the auditor’s planned degree of reliance on the control when the true compliance rate supports such reliance.

The risk of incorrect rejection and the risk of underreliance on internal accounting control relate to the efficiency of the audit. For example, if the auditor’s evaluation of an audit sample leads him or her to the initial erroneous conclusion that a balance is materially misstated when it is not,
the application of additional audit procedures and consideration of other audit evidence would ordinarily lead the auditor to the correct conclusion.

Similarly, if the auditor’s evaluation of a sample leads him or her to unnecessarily reduce the planned degree of reliance on internal accounting control, the auditor would ordinarily increase the scope of substantive tests to compensate for the perceived inability to rely on internal accounting control to the extent originally planned. Although the audit may be less efficient in these circumstances, the audit is nevertheless effective.

_The risk of incorrect acceptance and the risk of overreliance on internal accounting control relate to the effectiveness of an audit in detecting an existing material misstatement._

**KEY CONCEPTS TO REMEMBER: Sampling Risk**

- Sampling risk is choosing a sample that has proportionately more errors than the population.
- The term “sampling risk” refers to the possibility that even though a sample is properly chosen, it may not be representative of the population.
- Each time an auditor draws a conclusion based on evidence drawn from a sample, a sampling risk is introduced that draws an erroneous conclusion from sample data.

**(iii) Statistical Sampling and Nonstatistical (Judgmental) Sampling**

The use of any statistical sample requires a high degree of professional judgment to determine the confidence level and the reliability desired and thus what sample criteria to use. It takes judgment to evaluate the effectiveness of internal control procedures in order to test the accuracy and reliability of records as well as to recognize any errors in the items examined.

In using a statistical sample, the auditor must investigate by appropriate means any exceptions or irregularities noted in performing any auditing procedure. This may include a subsequent increase in the sample size. If there are no exceptions, the sample size should not be arbitrarily increased. Statistical sampling helps ensure that audit tests are adequate but not excessive and demonstrates objectivity.

When the choice is made to use statistical sampling, the first step is to devise a sampling plan. A statistical sampling plan includes five major steps.

**KEY CONCEPTS TO REMEMBER: Steps Involved in a Statistical Sampling Plan**

1. Define the audit objectives.
2. Define the population as clearly as possible, noting any distributional or systematic patterns. This step will establish the population size.
3. Determine the appropriate sampling method and sample selection technique that best fits the characteristics of the population.
4. Determine the precision and reliability desired.
5. Calculate the sample size.
One common error is the assumption that statistical sampling techniques are limited to customer confirmation programs. Auditors should look at all records and transactions that should be reviewed but, due to volume, must be sampled. Statistical sampling may apply to documentation tests, signature verifications, expenses, and so forth.

The auditor must be careful with statistical sampling. There are many different sampling techniques, and not all of them are appropriate in a given circumstance. Correct application of the wrong method is an error that is fairly common and should be avoided.

The auditor must not let the mere application of a statistical method lead to a false sense of security. Statistical samples are subject to some degree of error. Absolutely no inferences can be made from a statistical sample except that of the likelihood of the sample being representative of the population from which it is drawn. Statistical sampling is no substitute for judgment. The auditor must decide the sampling method most appropriate, the confidence level and precision that are appropriate, and even the correct definition of “population.” An error in any of these judgments can lead to incorrect conclusions in spite of the elegance of the mathematics.

Although using statistical methods to select samples is almost always preferable to selecting samples judgmentally, judgmental sample selection may be appropriate in some circumstances. However, auditors should always justify their use of judgmental sample selection in the working papers.

Sampling, whether statistical or nonstatistical (judgmental), is not appropriate when examination of 100% of an account balance is required, inquiry and observation techniques are used to collect audit evidence, and analytical procedures are used to evaluate the appropriateness of values reported by the auditee. Analytical procedures examine the entire population instead of examining only part, as in sampling. Accounts with low risk of material errors are included in the sample, and examination of few items is done without evaluating the characteristics of the population.

Auditors should document the conclusions drawn from the samples, whether the samples are statistically or judgmentally selected. When the population size and audit objectives are sufficient to warrant statistical samples, the samples will provide certain mathematical confidence levels to support the conclusions.

Exceptions must be classified as either critical or noncritical. Critical errors are those that cannot be tolerated (e.g., errors caused by deliberate falsification of transactions or account balances). Any critical errors must be analyzed and the underlying causes determined. The scope of the work also must be increased.

Noncritical errors are those exceptions that have a lesser impact (e.g., clerical or typing errors). If numerous clerical errors exist, the department should be required to resolve the problems, and sufficient follow-up audit procedures should be pursued.

Exhibit 3.4 summarizes similarities and differences between statistical and nonstatistical sampling approaches.

3.2 Data Analysis and Interpretation

Topics such as computerized audit tools and techniques and analytical review techniques are covered in this section.
(a) Computerized Audit Tools and Techniques

(i) Auditing around the Computer versus Auditing with the Computer

There are two approaches to testing computer-based data. They are characterized as auditing around the computer and auditing with the computer. The appropriate approach or combination of approaches is dependent on the nature of the related system (see Exhibit 3.5).

<table>
<thead>
<tr>
<th>Statistical sampling approaches</th>
<th>Nonstatistical sampling approaches</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Require auditor’s judgment</td>
<td>• Require auditor’s judgment</td>
</tr>
<tr>
<td>• Basic audit procedures are the same</td>
<td>• Basic audit procedures are the same</td>
</tr>
<tr>
<td>• Permitted as a professional standard</td>
<td>• Permitted as a professional standard</td>
</tr>
<tr>
<td>• Use the laws of probabilities to measure sampling risk associated with the sampling procedures</td>
<td>• Cannot measure the sampling risk</td>
</tr>
<tr>
<td>• Sample selection methods use statistics</td>
<td>• Sample selection methods may use statistics, but evaluation of the sample results could be nonstatistical</td>
</tr>
<tr>
<td>• Involve additional costs due to technical training required</td>
<td>• Fewer costs due to minimal training requirements</td>
</tr>
<tr>
<td>• Can explicitly measure and control sampling risk</td>
<td>• Sampling risk cannot be explicitly measured or controlled</td>
</tr>
<tr>
<td>• Require computer software and hardware for efficient use</td>
<td>• Do not require computer facilities</td>
</tr>
<tr>
<td>• Provide objective conclusions based on sample results</td>
<td>• Provide subjective conclusions that are subjected to challenge</td>
</tr>
<tr>
<td>• Compatible with limited number of sample selection methods</td>
<td>• Compatible with a wider variety of sample selection methods</td>
</tr>
<tr>
<td>• Sample is larger and is based on mathematics</td>
<td>• Sample is smaller and is based on judgment</td>
</tr>
</tbody>
</table>

EXHIBIT 3.4 Statistical and Nonstatistical Sampling Approaches

EXHIBIT 3.5 Auditing Around the Computer and Auditing with the Computer

(A) Auditing Around the Computer  Auditing around the computer assumes that techniques and procedures the computer uses to process data need not be considered as long as there is a visible audit trail and/or the result can be manually verified. This approach bypasses the computer in either of two ways.

In the first way, computer output is compared to or confirmed by an independent source. This approach confirms computer-processed data with third parties or compares data with physical counts, inspections, records, files, and reports from other sources. Physical counts and inspections can verify quantity, type, and condition of tangible assets.

Auditors can also conduct commonsense examinations of printed data output to reveal potential reliability problems. These inspections can establish data reliability when a low to very low
level of data testing is required. When a moderate to high level of testing is required, these tests should be supplemented by more extensive procedures. These questions are examples of commonsense data tests: Are amounts too small? Are amounts too large? Are data fields complete? Are calculations correct?

Although confirmations and comparisons directly test the accuracy of computer output and effectively disclose fictitious data, they may not detect incomplete data input. When data completeness is in doubt, confirmations or comparisons should be supplemented by tracing a sample of source records to computer output.

The second way to bypass the computer in confirming data reliability is to select source transactions, manually duplicate the computer processes, and compare the results with the computer output. Examples include salary payments, specific benefit payments, and loan balances and delinquent amounts.

Although this approach can test the completeness of computer output as well as the accuracy of computer processing, it does not disclose fictitious data (i.e., data that have been entered into the computer but are not supported by source records). If fictitious data are an issue, tracing data from the computer to source records should be considered.

The usefulness of auditing around the computer diminishes as the number and complexity of computer decisions increases. The process may be impractical when sophisticated data processing activities are involved. A principal disadvantage of auditing around the computer is that the integrity of the audit trail through the computer is not tested.

(B) Auditing with the Computer  Auditing with the computer means that computer-programmed tests are used, in part, to measure data reliability.

After determining the completeness and accuracy of computer input by manually tracing data to and/or from a sample of source records, this approach uses auditor-developed computer-programmed tests to examine data reasonableness and identify defects that would make data unreliable.

An advantage of auditing with the computer is that it can be used regardless of the computer system’s complexity or the number of decisions the computer makes. Auditing with the computer is also fast and accurate, permitting a much larger scope of testing than would be practical with other methods.

The first step in developing computer-programmed tests is to identify what computer information is to be used as evidence and what data elements were used to produce it. Auditors should test all data elements that affect the assignment objective(s).

When an audit-significant data element is derived (i.e., calculated by the computer based on two or more data elements), auditors should also test the source data elements. For example, the element “net pay” might be planned for use as evidence to meet an assignment’s objective(s). Review of the system’s data dictionary shows that a computer program uses three other data elements to calculate net pay: “hourly rate,” “hours worked,” and “deductions.” Errors in any of these data elements would make “net pay” incorrect. Therefore, auditors should determine the accuracy of each data element.

After identifying the relevant data elements, the data dictionary can be examined to define the attributes of each data element and identify rules that each should meet. If a data element fails
these requirements, the computer may exclude it or process it in a way that does not ensure an accurate result. Computer programs frequently have default logic that may cause a missing or defective data element to be erroneously processed due to incorrect assumptions.

Understanding a data element also makes it possible for audit staff to develop reasonableness assumptions that can be programmed as commonsense tests. Data attributes should also consider expected relationships among data elements. Although developed independently, a data element may have a reasonable relationship to another data element. For example, some kinds of medical procedures are related to age or gender. Determining and testing relationships can reveal errors by disclosing irrational or unlikely relationships, such as a hysterectomy on a male patient.

When auditors have learned about each of the data elements that affects the information relied on, tests are developed to detect errors. Tests are of two types: (1) those that disclose failures of data elements to meet established requirements (called unconditional data tests) and (2) those that disclose illogical relationships (called conditional data tests).

After data tests are developed, the computer is programmed to apply them. The programmed data tests must be validated and tested to ensure that errors revealed during the data testing are the result of incorrect data and not the result of invalid test programs. Data tests can be developed without knowledge of the technical design of the database or its structure, and layout. This knowledge, however, is needed to program the tests.

Whether a personal computer or a mainframe computer should be used to process data test depends on factors such as the size of the database, the number and complexity of data tests, required processing speed, computer accessibility, and team expertise. The key point is to ensure that test requirements are properly matched to the application and to the operating environment (personal versus mainframe computer).

(ii) Embedded Audit Modules
Embedded audit data collection modules use one or more specially designed data collection modules embedded in the computer application system to select and record data for subsequent analysis and evaluation. The data collection modules are inserted in the application system or program at points that the auditor determines to be appropriate. The auditor also determines the criteria for selection and recording. Other automated or manual methods may be used to analyze the collected data. This technique is intended to highlight unusual transactions and subject them to audit review and testing. Another name given to this technique is system control audit review file (SCARF).

Unlike other audit methods, this technique uses in-line code; that is, the computer application program performs the audit data collection function at the same time it processes the data for normal production purposes. This has two important consequences for the auditor: (1) in-line code ensures the availability of a comprehensive or very specialized sample of data as desired by the auditor, since strategically placed modules have access to every data element being processed; and (2) retrofitting this technique to an existing system is more costly than implementing the audit module during system development. Therefore, it is preferable for auditors to specify requirements in this regard while the application system is being designed. Ideally, data collection control points should be inserted in the application program processing logic where errors, irregularities, or security breaches are most likely to occur.
(iii) Data Extraction Techniques
Many data extraction tools and techniques are available, such as fourth-generation programming languages, audit hooks, and extended records, and others.

(A) Fourth-Generation Programming Languages
Relatively speaking, the fourth-generation programming languages (4GLs) are easy to learn and easy to use than the third-generation languages. 4GLs have online real-time, interactive, query characteristics with a quick turnaround time. 4GLs are command driven and user-friendly software and use nonprocedural statements, unlike the third-generation programming languages (e.g., COBOL) and the traditional audit software packages. Some 4GLs contain both procedural and nonprocedural statements.

With the use of 4GLs, the auditor can make inquiries against online data files. 4GLs can merge different data records and data files. Many 4GLs perform most of the functions that a traditional audit software package does, but 4GLs do not come with some functions, such as accounts receivable aging and confirmations and statistical sampling, that are common to traditional audit software packages. If these functions are needed, the auditor has to insert them in the 4GLs by developing them as special subroutines written in COBOL, FORTRAN, or PL/1 programming languages.

An advantage of 4GLs is their free-format report requests. The use of a 4GL package may enhance auditors’ productivity. Any viable 4GL package can be used as a supplement to traditional audit software packages but not as substitute for them.

(B) Audit Hooks
Audit hooks are similar to red flags to auditors. They are computer programs used in high-risk systems and are triggered by a condition or event designed by the auditor in conjunction with the information systems (IS) staff and the user. The objective is to act before an error, abnormality, or irregularity gets out of hand. Audit hooks are inserted in application programs to function as red flags. For example, bank internal auditors can use the audit hook in a program that processes dormant customer accounts to observe the activity in the account and, if need be, initiate timely action to correct or eliminate any irregularities that are identified. The difference between the audit hooks technique and the SCARF technique is that an audit hook is used more discreetly for sensitive applications.

(C) Extended Records
The extended record technique collects, by means of a special program(s), all the significant data that have affected the processing of an individual transaction. This includes the accumulation of the results of processing into a single record covering the time period that the transaction required to complete processing. The extended record includes data from all the computer application systems that contributed to the processing of a transaction. Such extended records are compiled into files that provide a conveniently accessible source of transaction data. Auditors can extract the transactions that have such extended records using generalized audit software or utility programs and prepare reports for audit review and analysis.

With this technique, the auditor no longer needs to review several computer data files to determine how a specific transaction was processed. With extended records, data are consolidated from different accounting periods and from systems interfacing with the application system being reviewed so that a complete transaction audit trail is physically included in one computer record. This facilitates tests of compliance to organization policies and procedures.
(iv) Generalized Audit Software

Generalized audit software (e.g., ACL and IDEA) should be used to achieve cost-effective audits of computer-based systems where similar audit tasks are required to meet a variety of objectives. Generalized audit software can:

- Provide totals of unusual items.
- Check for duplications, missing information, or range of values.
- Verify calculation totals and analyses produced.
- Examine the existence and consistency of data maintained in files.
- Perform concurrent auditing of data files.
- Select and generate audit confirmations.

The audit software is most effective in verifying the clerical accuracy of an account balance. It is least effective in evaluating the logic of a specific computer program, evaluating the adequacy of internal controls embedded in a computer program, or confirming the existence of internal controls in manual operational procedures.

A limitation to using the audit software is that it can be used only on hardware with compatible operating systems. The audit software does not require significant programming knowledge to be used effectively. It does not require lengthy detailed instructions in order to accomplish specific tasks. It does not require significant modification of the program to be of use. The audit software cannot specify which data elements will be tested and the criteria to be used. The auditor specifies the criteria.

Generalized audit software is the most widely used technique for auditing computer application systems. This technique permits the auditor to analyze a computer-application system data file independently.

Most generalized audit software packages, because of their widespread use and long history, are reliable, highly flexible, and extensively and accurately documented. They are used to test the functions of data editing and validation routines in computer programs.

Generalized audit software packages can foot, cross-foot, balance, stratify, select a statistical sample, select transactions, total, compare, and perform calculations on diverse data elements contained within various data files.

These extensive capabilities are available to the auditor to substantively test computer application programs. Generally, this audit method is used to test the integrity of computer records in a data file or files and not to test the application program logic. However, some insights into the logic may surface through the use of generalized audit software.

Generalized audit software packages are available for batch and online systems. However, in a database environment, generalized audit software may not be usable directly because of complex data storage and access structures. In this case, there are two approaches to this problem.

1. Copy the required portion of the database onto a sequential file that can be accessed with the generalized audit software.

2. Develop a computer interface program that uses the database management system software to access the database.
Many audit software packages that are currently available examine data in personal computer files independently and interactively. Required data files can be downloaded from the host to a personal computer based on some selection criteria. Downloading is a process for selecting and retrieving data from another computer system in a way that makes it usable on a personal computer. It requires the establishment of a compatible communication link between the personal computer and the mainframe computer. This method is used when data already exist in automated form. The data may be available on the computer system or on another electronic medium, such as magnetic tape.

Downloading is frequently used when selecting data from very large data files stored on a mainframe or on tape used on the mainframe. To establish the link between the micro- and mainframe computer, the auditor must determine the appropriate communication protocol and have access rights on the mainframe computer. Standard software for downloading data can be used to select the desired data elements for use. Once the data have been downloaded to the personal computer, they may have to be reformatted for use with available personal computer software.

Another method of entering data into a particular personal computer is to communicate it from another personal computer. Two compatible personal computers can exchange data by using disks, flash drives, thumb drives, pen drives, USB drives or by using existing phone lines and a communications program. Communication links among personal computers permit data entered into a personal computer in the field to be transferred to a headquarters system. A local area network permits data to be transferred to designated recipients on the network or to be stored in common storage files with relative ease.

In some cases, the audit software can be developed on the personal computer and then uploaded to the host computer for program execution. After the program is executed, the results can either stay on the host or be downloaded to a personal computer.

Some personal computer-based packages include interactive procedures for performing a full range of audit tests, such as analyzing data fields, sampling transactions and records, validating data, testing and converting dates, and producing statistical summaries. Reports required by the auditor can be produced in the graph, tables, charts, or hard-copy format.

Two examples of the application of personal computer audit software in a payroll audit follow.

1. Compare current period amounts with previous period amounts for employee gross and net payroll wages. Identify employees with unusual pay amounts after performing reasonableness tests.
2. Select all transactions in specified activity codes and in excess of predetermined amounts. Trace them to proper authorization in personnel files in order to determine if payroll changes are authorized.

Advantages of generalized audit software are:

- It is most widely used to analyze and extract data from computer files.
- It allows the auditor to examine more data on computer records in more detail than when using manual records.
- It can be used to automate working paper preparation.
- It enables auditors to control their own programming and testing work.
- It minimizes the audit staff time allocated to audit testing.
It minimizes the cost of adapting audit program routines to frequent changes in the application program being used due to a parameter-driven approach used in the audit software.

Disadvantages of generalized audit software are:

- It is least likely to be used for inquiry of online data files.
- It cannot flowchart an application program logic.
- It cannot perform a physical count of inventory or cash.
- It cannot perform continuous monitoring and analysis of transactions.
- It can require IS technical knowledge.

(A) Terminal Audit Software

Terminal audit software accesses, extracts, manipulates, and displays data from online databases using remote terminal inquiry commands. This technique provides the same basic functional capability as the more widely used batch-oriented generalized audit software. It has the advantages of a quicker turnaround and interactive investigation. It provides direct access to data files for periodic audit examination without extensive setup procedures or separate processing. It is, however, useful only in situations where online databases have been established and are already in use.

(B) Special-Purpose or Customized Audit Software

Special-purpose or customized audit software consist of specially developed computer programs to extract and report data from a specific application system's data files. A focused approach in meeting audit needs is the major advantage. Disadvantages associated with the use of these audit programs are their limited applicability, inflexibility, development cost and time, and high level of computer programming expertise required.

Another problem encountered in using these programs is the maintenance needed to keep pace with changing audit requirements and changing application system functions. On occasion, utility programs can be used for audit purposes.

(v) Spreadsheet Analysis

Auditors perform spreadsheet analysis very extensively with the use of personal computer-based software packages, such as Spreadsheet Auditor and Spreadsheet Analyst. These software packages are designed to serve as an aid in creating error-free spreadsheets. The software prints out: a description of ranges; a map indicating which cells contain formulas, labels, numbers, or macros; and a formula report. A critical point is the accuracy of formulas used in spreadsheet cells and their applicability to business rules.

A list of suggested controls for spreadsheet work follows.

- Spreadsheets should be mapped out clearly to show how the spreadsheet should look. A record of changes should be maintained for important data.
- Proper analysis should be conducted to ensure that the data required for analysis are included and entered in a format amenable to the analytic techniques planned.
- A specific area within the spreadsheet should be designated for data entry to minimize data entry errors. All data should be entered in that area and verified before the data are used.
- A specific area should be denoted in the spreadsheet for parameters of the data entry.
Sampling and validation criteria should be established for each individual spreadsheet based on principles and judgment.

Critical data should undergo more vigorous verification methods.

Adequate quality assurance measures should be implemented during the data entry and analysis stage. This will help eliminate errors and facilitate supervisory review and referencing. Some guidelines include:

- Minimize data entry errors by using the pointer method to specify a cell or range rather than typing in cell addresses and copying formulas and then editing. Take the time to verify the formula before copying it.
- Use range names, as they are a good way to identify cells. To facilitate the supervisor’s and referencer’s review, prepare a list of all named ranges and their locations in the spreadsheet.
- Protect formulas and key data by using the range protect command.
- Test the spreadsheet’s features, including its formulas and macros, with a small part of the database to ensure that the spreadsheet works as planned. Using a partial database rather than a complete spreadsheet saves time and makes it easier to identify errors in logic.
- Correct mistakes as soon as they are identified.
- Format cells using two decimals.
- Write out macros by spelling what each macro command means.

To ensure the accuracy of data entry, these precautions should be taken prior to printing the spreadsheet:

- Use foots and cross foots. By adding an extra row and column of formulas that bracket the totals, the accuracy of the preliminary results can be checked.
- Use hash totals. To verify that all records are included in the spreadsheet, various hash totals can be used. These totals can be arrived at by adding up the data elements to be used in the subsequent analysis.
- Use automatic recalculations feature. Each spreadsheet should be set on automatic recalculation for a final recalculation before the information is used in the report and the spreadsheet is given to a referencer or supervisor to be used as support for a statement of fact.
- Protect the spreadsheet. After verification, when no further changes are anticipated to the spreadsheet, the entire spreadsheet should be protected using the global protect feature.
- Print out spreadsheet formulas. Printing the formulas facilitates spreadsheet review for accuracy.
- Include reasonableness checks into formula or particular cells; for example, tax rate should not exceed a certain percentage.

Some spreadsheets may require more extensive documentation than is practical to place within the spreadsheet itself. In such instances, external documentation should be used for detailed explanation of the spreadsheet. The external documentation should be placed in word processing software or other means. The internal documentation would still contain the next elements, with keys to the external documentation.

- Job title and code, title of the spreadsheet, work paper index.
☐ Purpose of the spreadsheet, reviewer and date, description of the spreadsheet, source of data entered.

☐ Documenting the cell addresses for each component of the spreadsheet showing data entry, formula explanations, macro explanations and purpose, range names and their cell addresses.

☐ Maintain backup copies of spreadsheet data whenever changes are made. Backup copies should be kept in a location that is secure and different from the location where originals are kept.

☐ Spreadsheet applications should be reviewed and tested, both manually and by using audit software. Typical functions that can be provided by spreadsheet audit software include:

☐ Documenting the contents of macros used within the spreadsheet as a basis for verifying the logic.

☐ Providing a global view of the contents of the spreadsheet application to scan reports for particular patterns or configurations.

☐ Verifying for circular references.

☐ Displaying the contents of a cell.

Adequate training should be provided to potential users of the spreadsheet software.

**(vi) Automated Work Papers**

Automated work paper software helps auditors to increase efficiency and productivity because it relieves the boredom of writing out by hand. The software automatically refers to audit work program sections and related audit objectives. Any corrections or changes can be done with ease and without losing the continuity.

Other documentation aids can also help the internal auditor during the fieldwork. One of the ways that an auditor can make sure that the intentions of program/system changes have been achieved is through the use of automated documentation aids. If used properly, these documentation aids can provide flowcharts, tables, or graphs of the program or the system that can be compared at two different points in time (i.e., before and after the program change). Any differences indicate changes to the program logic, data file contents, and Job Control Language (JCL) procedures. The auditor then locates and analyzes the supporting documentation prepared in order to authorize and implement the changes.

Program or system flowcharts, tables, or graphs generated by the automated documentation aids provide a correct picture of what is in the computer programs and data files as opposed to relying on incorrect, obsolete, or incomplete documentation maintained on paper. Automated documentation aids include:

- Automated flowchart software packages, which read the source code for a computer program and convert it into an easy-to-read flowchart.

- Computer data file translation software packages, which read the data file descriptions in the computer program and convert them into a convenient and readable format (tabular and graphic).

- JCL software packages, which depict the job control flow as a graph or table showing the sequence of jobs or steps executed and indicating their procedure names and numbers.
(vii) Source Code Comparison
The best audit tool and technique that an auditor in charge of reviewing program changes can find is a source code compare utility program. Why review and compare source code? It is where program changes, whether authorized or unauthorized, can be made. Source code explains the functions, features, and capabilities of a computerized application system. Programmers write source code in a programming language, such as COBOL. Hence it is most vulnerable to program changes. After the source code is developed, it is placed in a production source code library, which is often protected from unauthorized modifications by the use of program library management software packages.

Simply stated, a source code compare utility program takes two versions of a source code, compares each line of code, and indicates differences and whether the line of code is added, changed, or deleted. This output can be used in a structured walk-through or for management and auditor reviews. The auditor then locates and analyzes the supporting documentation (system, program, computer operations, and user) prepared to authorize and implement the program changes. Lack of supporting documentation is a weakness in controls, which is an indication of potential risk and exposure. The auditor needs to inform management to strengthen internal controls over software maintenance activities.

(viii) Object Code Comparison
As indicated in the previous section, programmers write source code in a programming language, such as COBOL. Later the source code is translated into machine-readable language—object code—for proper execution of the program. Compiler software supplied by vendors performs the translation of source code into object code. Load/executable code, which comes after the object code is link-edited, is then placed in a production library and used for the processing of live data for an application system.

By itself, a source code compare utility software package, described in the previous section, may not be sufficient to ensure that programs are changed properly and effectively. An additional approach is needed to ensure that the object code being executed in production mode is in agreement with the authorized source code.

The auditor can use object code compare utility software packages for comparison of two versions of a program’s object code to report any differences. This is accomplished through four steps.

1. Identify the current version of production source code.
2. Recompile the current version of production source code to obtain the corresponding object code (say, Item 1).
3. Inspect the production JCL for correct program name and production library where the object code to be compared (say, Item 2) is placed.
4. Compare Item 1 and Item 2 of object code using an object code compare utility software package.

Any differences indicate that the object code in the production library that is used for program processing is not generated from the corresponding source code. This requires analysis and corrective action by the information technology staff and the auditor. Combined with the source code compare, an object code compare tool is an effective method of detecting, identifying, and controlling program/system changes.
(ix) File Comparison Utility Program
File compare is performed by a utility program supplied by a software vendor (e.g., IEBCOMPR by IBM). The purpose of the tool is to identify differences in data field names and values in two files of data at a static point in time. For example, in a manufacturing environment, a file compare utility program can be used to compare the "on-hand inventory balance" data field appearing in two different files to determine if the values are the same. If not, an abnormal situation exists. This may require analysis and correction if the two values are supposed to be the same.

Another example is to compare file control totals in accounts receivable or payable subsidiary ledger files to file control totals maintained in the general ledger file. Accounting logic requires that these two file control totals be the same. If they are not, an abnormal situation exists. Also, this tool can be used to compare JCL file contents at two points in time to detect any changes. The auditor needs to be imaginative to use this powerful tool in either software maintenance or development activities.

(x) Test Data Method
The test data method verifies computer-processing accuracy of application programs by executing these programs using manually prepared sets of test cases, test data, and expected results of processing. Actual processing results are compared with the expected results. If the two results are identical, the auditor may infer that the program logic is consistent with the documentation.

This method provides auditors with a procedure for review, testing, and evaluation of computer program logic. However, because of continual program changes, preparing and maintaining test data manually is very difficult and time consuming. In addition, the test data method is not an appropriate technique for verification of the accuracy and completeness of production data or master files.

Automated test data generators are available to create large volumes of test data in complex data formats with relatively little effort. They can be used as input to the application program to be tested. This technique, combined with an automated code optimizer program, provides statistics on the number of times a program statement line code was executed and highlights the program sections that were not used during computer processing. Automated code optimizer programs can be used to evaluate test data prepared either manually or by an automated test data generator program. Test data method can be used to test both batch and online programs.

(xi) Base Case System Evaluation
Base case system evaluation (BCSE) is a technique that applies a standardized body of data (input, parameters, and output) to the testing of computer application programs. User staff members, with auditor participation, establish this body of data (the base case) as the criterion for correct functioning of the computer application system. This testing process is widely used as a technique for validation of production systems.

Some organizations use the base case approach as a means to test computer programs during their development, demonstrate the successful operation of the system prior to its implementation, and verify its continuing and accurate processing during its production life. As a result, this approach requires and represents a total commitment by data processing and user department management to the principles and disciplines of BCSE.
(xii) Integrated Test Facility
Integrated test facility (ITF) is a technique to review application program logic and functions to provide the auditor with evidence on operating procedures (computer and/or manual) and error handling conditions. The auditor’s test data for a fictitious entity (i.e., a branch, department, division, or subsidiary) are used to compare ITF processing results to precalculated and expected test results. Here the auditor’s test data are processed with normal production data. The auditor, however, must ensure that the ITF results for the fictitious entity are removed from the regular production data files either at the end of testing process or later, in order to eliminate its impact on the organization’s financial and operating transactions and records. ITF can be used in batch and online application systems.

(xiii) Parallel Simulation
Parallel simulation is the use of one or more special computer programs to process “live” data files and simulate normal computer application processing. As opposed to the test data method and the integrated test facility, which process test data through live programs, the parallel simulation method processes live data through test programs. Generalized audit software can be used to create a test model or simulation of relatively simple application systems or a portion of more complex application systems.

Parallel simulation programs include only the application logic, calculations, and controls that are relevant to specific audit objectives. As a result, simulation programs are usually much less complex than their application program counterparts. Often large segments of major applications that consist of several computer programs can be simulated for audit purposes with a single parallel simulation program. Parallel simulation permits the auditors to independently verify complex and critical application program controls and procedures. Parallel simulation is also used to test computer programs and complex processing logic, such as interest calculations, during system development projects.

(xiv) Snapshot
Both auditors and IT staff periodically encounter difficulty in reconstructing the computer decision-making process. The cause is a failure to keep together all the data elements involved in that process. Snapshot is a technique that, in effect, takes a picture of the parts of computer memory that contain the data elements involved in a computerized decision-making process at the time the decision is made.

Input transactions are tagged and written to an audit log file with date, time, and indication of the point in the program at which the snapshot occurred. The results of the snapshot are printed in a report for review and analysis.

The snapshot audit technique offers the ability of listing all the data that were involved in a specific decision-making process. The technique requires the necessary logic to be preprogrammed in the system. A mechanism, usually a special code in the transaction record, is added for triggering, logging, and printing of the data in question for analysis.

The snapshot audit technique may help auditors answer questions as to why computer application systems produce questionable results. It provides information to explain why the computer made a particular decision.

Used in conjunction with other audit techniques (e.g., ITF or tracing), this technique aids in the determination of what results would occur if a certain type of input were entered the application system. The snapshot technique can also be an invaluable aid to systems and programming staff
in debugging the application system because it can provide “pictures” of the computer memory. Ideally, the snapshot technique should be designed as part of the original application system development process. The auditor participates in the system development process by defining requirements and reviewing system design specifications and system test results.

(xv) Tracing
A traditional audit technique in a manual environment is to follow the path of a transaction during processing. For example, an auditor picks up a customer order as it is received into an organization and follows the flow from department to department. The auditor inquires of the employee involved what actions were taken at that particular step in the processing cycle.

Since the auditor understands the policies and procedures of the organization, he or she can judge whether they are being followed adequately. By the time the auditor has walked through the processing cycle, he or she has an appreciation of how work flows through the organization.

In an IT environment, it is not possible to follow the path of a transaction through its processing cycle solely by following the paperwork flow, since the computer accomplishes many of the functions performed by employees and no hard-copy documents are produced. A new type of audit evidence (electronic) is introduced in the IT environment.

Tracing is an audit technique that provides the auditor with the ability to perform an electronic walk-through of a computer application system. The audit objective of tracing is to verify compliance with policies and procedures by substantiating, by examining the path a transaction followed through a program, how that transaction was processed. Tracing can be used to detect omissions.

Tracing shows what instructions have been executed in a computer program and in which sequence they have been executed. Since the instructions in a computer program represent the steps in processing, the processes that have been executed can be determined from the results of the tracing audit technique. Once an auditor knows what instructions in a program have been executed, he or she can perform an analysis to determine if the processing conformed to the organization’s policies and procedures.

(xvi) Mapping
Mapping is a technique used to assess the extent of system testing and to identify specific program logic that has not been tested. Mapping is performed by software measurement tools that analyze a computer program during execution and indicate which program statements have been executed. The software measurement tool can also determine the amount of central processing unit time consumed by each program segment.

The original intent of the mapping concept was to help computer programmers ensure the quality of their programs. Auditors can use the same software measurement tools, however, to look for unexecuted program statements. This analysis can provide auditors with insight into the efficiency of program operation and can reveal unauthorized program segments or statements included, if any exist.

(xvii) Control Flowcharting
In a complex business environment, it is difficult to thoroughly understand the total system of control of an organization within its total business and operational context. A graphic technique, or flowchart, for simplifying the identification and interrelationships of controls can be a great
help in evaluating the adequacy of those controls and in assessing the impact of system changes on the overall control profile.

Flowcharts facilitate the explanation of controls to a system analyst, auditor, or people unfamiliar with specific functions of the system. They also aid in ascertaining that controls are operating as originally intended or planned.

The control flowcharting technique provides the documentation necessary to explain the system of control. Often an organization’s information about controls is fragmented. This fragmentation makes obtaining a clear picture of the controls operating within the organization difficult. The availability of an overall picture of controls, using several levels of flowcharts, facilitates understanding.

(xviii) Control Reprocessing
Control reprocessing is a technique to identify lost or incomplete records during an update cycle. An update cycle of importance is reprocessed to compare against the original update to determine whether the results are the same between the two updates, original and reprocessed. If the results are not the same, analysis is conducted to identify the sources causing the difference.

WHICH COMPUTER-ASSISTED AUDIT TECHNIQUE METHOD USES WHAT?

- The test data method uses test data with production programs.
- The parallel simulation method uses production data with test programs.
- The ITF method uses test data with production programs.
- The embedded audit data collection, generalized audit software, snapshot, audit hooks, tracing, mapping, extended records, and transaction selection methods all use production data with production programs.

(xix) Conventional and Concurrent Audit Techniques
In a conventional audit using a computer-assisted audit technique (CAAT) on an after-the-fact-basis, auditors evaluate the controls at periodic intervals. Using concurrent audit techniques, controls are evaluated on a continuing basis. Audit evidence is collected in a timely manner.

Exhibit 3.6 presents a comparison between conventional and concurrent audit techniques.

<table>
<thead>
<tr>
<th>Conventional audit techniques</th>
<th>Concurrent audit techniques</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Examples: generalized audit software, test data method, transaction selection, extended records, tracing, mapping, utility programs.</td>
<td>• Examples: ITF, SCARF, simulation, snapshots, audit hooks.</td>
</tr>
<tr>
<td>• Most appropriate for computerized batch, simple, and normal application systems.</td>
<td>• Most appropriate for computerized online, complex, and sensitive application systems.</td>
</tr>
<tr>
<td>• Require less data processing technical knowledge on the auditor’s part.</td>
<td>• Require more data processing technical knowledge on the auditor’s part.</td>
</tr>
<tr>
<td>• Mostly use test data instead of production data.</td>
<td>• Mostly use production data instead of test data.</td>
</tr>
<tr>
<td>• Not part of user production application systems.</td>
<td>• Part of production application systems.</td>
</tr>
<tr>
<td>• Auditor has more control over test data.</td>
<td>• Auditor has less control over test data.</td>
</tr>
<tr>
<td>• Auditor initiates CAAT program execution to test plans and schedules.</td>
<td>• Application system initiates CAAT program execution according to specified event, transaction, date, time, and other criteria.</td>
</tr>
</tbody>
</table>

EXHIBIT 3.6 Conventional and Concurrent Audit Techniques
(b) Analytical Review Techniques

The scope of analytical review techniques includes ratio estimation, variance analysis, and reasonableness tests.

(i) Ratio Estimation

Four types of measures are used to analyze a company’s financial statements and its financial position: (1) common-size analysis, (2) trend analysis, (3) comparative ratios, and (4) single (or simple) ratios (see Exhibit 3.7).

EXHIBIT 3.7 Types of Financial Statement Analysis

<table>
<thead>
<tr>
<th>Types of financial statement analysis</th>
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</thead>
<tbody>
<tr>
<td>Common-size analysis (vertical, horizontal)</td>
</tr>
<tr>
<td>Trend analysis</td>
</tr>
<tr>
<td>Comparative ratios</td>
</tr>
<tr>
<td>Single ratios</td>
</tr>
</tbody>
</table>

**Common-size analysis** expresses items in percentages, which can be compared with similar items of other firms or with those of the same firm over time. For example, common-size balance sheet line items (both assets and liabilities) are expressed as a percentage of total assets (e.g., receivables as x percent of total assets). Similarly, common-size income statement line items are expressed as a percentage of total sales (e.g., cost of goods sold as x percent of total sales).

Variations of common-size analysis include vertical analysis and horizontal analysis. **Vertical analysis** expresses all items on a financial statement as a percentage of some base figure, such as total assets or total sales. Comparing these relationships between competing organizations helps to isolate strengths and areas of concern.

In **horizontal analysis**, the financial statements for two years are shown together with additional columns showing dollar differences and percentage changes. Thus, the direction, absolute amount, and relative amount of change in account balances can be calculated. Trends that are difficult to isolate by examining the financial statements of individual years or comparisons with competitors can be identified.

**Trend analysis** shows trends in ratios, which gives insight whether the financial situation of a firm is improving, declining, or stable. It shows a graph of ratios over time, which can be compared with a firm’s own performance as well as that of its industry.

**Comparative ratios** show key financial ratios, such as current ratio and net sales to inventory, by industry, such as beverages and bakery products. These ratios represent average financial ratios for all firms within an industry category. Many organizations supply ratio data, and each one designs ratios for its own purpose, such as small firms or large firms. Also, the focus of these ratios is different, such as creditor’s viewpoint or investor’s viewpoint. Another characteristic of the ratio data-supplying organization is that each has its own definitions of the ratios and their components. Due to these differences, examiners must be cautious when interpreting these ratios.

Another type of comparative analysis is comparing the financial statements for the current year with those of the most recent year. By comparing summaries of financial statements...
for the last five to ten years, trends in operations, capital structure, and the composition of assets can be identified. This comparative analysis provides insight into the normal or expected account balance or ratio, information about the direction of changes in ratios and account balances, and insight into the variability or fluctuation in an organization’s assets or operations.

### Trend Analysis versus Comparative Ratio Analysis

- In trend analysis, trends are shown over time between the firm and its industry.
- In comparative ratio analysis, a single point (one-to-one) comparison is shown between the firm and its industry.
- In both analyses, the industry's ratio is an average ratio, while the firm's ratio is not.

Next, our focus will shift to **single (or simple) ratios**. Certain accounts or items in an organization's financial statements have logical relationships with each other. If the dollar amounts of these related accounts or items are expressed in fraction form, then they are called ratios. These ratios are grouped into five categories: (1) liquidity ratios, (2) asset management ratios, (3) debt management ratios, (4) profitability ratios, and (5) market value ratios. Exhibit 3.8 presents individual ratios for each ratio category.

<table>
<thead>
<tr>
<th>Ratio category</th>
<th>Individual ratios</th>
</tr>
</thead>
<tbody>
<tr>
<td>Liquidity (1)</td>
<td>Current, quick, or acid test</td>
</tr>
<tr>
<td>Asset management (2)</td>
<td>Inventory turnover, days sales outstanding, fixed assets turnover, total assets turnover</td>
</tr>
<tr>
<td>Debt management (3)</td>
<td>Debt to total assets, time-interest-earned, fixed charge coverage, cash flow coverage</td>
</tr>
<tr>
<td>Profitability (4)</td>
<td>Profit margin on sales, basic earning power, return on total assets, return on common equity, earnings per share, payout</td>
</tr>
<tr>
<td>Market value (5)</td>
<td>Price/earnings, book value per share, market/book</td>
</tr>
</tbody>
</table>

**EXHIBIT 3.8  Ratio Categories with Examples**

#### (ii) Variance Analysis

Budgets and standards are used to plan an operation and measure its progress. **Variance** is the difference between budget or standard and actual. For example, if actual spending is greater than the budget, a negative variance results. If actual spending is less than the budget, a positive variance results. Managers need to analyze both positive and negative variances for reasonableness because people play psychological games with budgets, such as inflating a budget for personal gain.

#### (iii) Reasonableness Tests

The reasonableness test procedure involves the use of selected operating data, associated financial data, and external data to predict an account balance. Reasonableness tests can be used to determine whether input data, updated data, calculated data, or output data are reasonable. Ascending or descending checks for numeric and alphabetic data can be performed. Tolerance tests measuring dollar or percentage deviation can be designed.
Reasonableness tests of expense accounts are common. Two examples are when the auditor or analyst (1) estimates a value for utilities expense based on average temperature and hours of operation, and (2) estimates payroll expense from operating data on the number of employees, the average pay rates, and the number of days of applicable operations.

The reasonableness test can be particularly effective because it links the financial data directly to relevant operating data. When variations in operations are the principal cause for variations in the related accounts (especially the expense accounts), reasonableness tests provide a relatively precise means of detecting errors and frauds affecting these accounts. That is, when a fraud is committed, it is likely that the reported financial and operating facts will not agree. The perpetrator will find it difficult to disguise both the financial data and the related operating data.

For example, a reasonableness test of payroll expense can be an effective means of detecting fraud if there are phony employees or excess time is charged, because personnel records also must be manipulated fraudulently in the same pattern to prevent detection. Because these methods effectively model the relationships between the financial data and the operating transactions that are the basis for the recorded financial data, reasonableness tests are potentially the most effective of the analytical procedures.

Examples of generic reasonableness tests include:

- Airline passenger departure flight time is not reasonable with arrival flight time for the same day.
- Customer order quantity is not reasonable with historical order.
- Prices on purchase orders are not reasonable with the prices on purchase invoices or purchase requisitions.
- Stock-status dollar values are not reasonable with general ledger amounts.
- Shipment values are not reasonable with billed amounts.

IIA STANDARD APPLICABLE TO ANALYTICAL REVIEW TECHNIQUES

2320 – Analysis and Evaluation

Internal auditors must base conclusions and engagement results on appropriate analyses and evaluations.

Practice Advisory 2320-1: Analytical Procedures

1. Internal auditors may use analytical procedures to obtain audit evidence. Analytical procedures involve studying and comparing relationships among both financial and nonfinancial information. The application of analytical procedures is based on the premise that, in the absence of known conditions to the contrary, relationships among information may reasonably be expected to exist and continue. Examples of contrary conditions include unusual or nonrecurring transactions or events; accounting, organizational, operational, environmental, and technological changes; inefficiencies; ineffectiveness; errors; fraud; or illegal acts.

2. Analytical procedures often provide the internal auditor with an efficient and effective means of obtaining evidence. The assessment results from comparing information with expectations identified or developed by the internal auditor. Analytical procedures are useful in identifying:

- Unexpected differences.
- The absence of differences when they are expected.

(continued)
Potential errors.
Potential fraud or illegal acts.
Other unusual or nonrecurring transactions or events.

3. Analytical audit procedures include:
- Comparing current-period information with expectations based on similar information for prior periods as well as budgets or forecasts.
- Studying relationships between financial and appropriate nonfinancial information (e.g., recorded payroll expense compared to changes in average number of employees).
- Studying relationships among elements of information (e.g., fluctuation in recorded interest expense compared to changes in related debt balances).
- Comparing information with expectations based on similar information for other organizational units as well as for the industry in which the organization operates.

4. Internal auditors may perform analytical procedures using monetary amounts, physical quantities, ratios, or percentages. Specific analytical procedures include ratio, trend, and regression analysis; reasonableness tests; period-to-period comparisons; comparisons with budgets; forecasts; and external economic information. Analytical procedures assist internal auditors in identifying conditions that may require additional audit procedures. An internal auditor uses analytical procedures in planning the engagement in accordance with the guidelines contained in Standard 2200.

5. Internal auditors may use analytical procedures to generate evidence during the audit engagement. When determining the extent of analytical procedures, the internal auditor considers the:
- Significance of the area being audited.
- Assessment of risk management in the area being audited.
- Adequacy of the internal control system.
- Availability and reliability of financial and nonfinancial information.
- Precision with which the results of analytical audit procedures can be predicted.
- Availability and comparability of information regarding the industry in which the organization operates.
- Extent to which other procedures provide evidence.

6. When analytical audit procedures identify unexpected results or relationships, the internal auditor evaluates such results or relationships. This evaluation includes determining whether the difference from expectations could be a result of fraud, error, or a change in conditions. The auditor may ask management about the reasons for the difference and would corroborate management’s explanation, for example, by modifying expectations and recalculating the difference or by applying other audit procedures. In particular, the internal auditor needs to be satisfied that the explanation considers both the direction of the change (e.g., sales decreased) and the amount of the difference (e.g., sales decreased by 10%). Unexplained results or relationships from applying analytical procedures may be indicative of a significant problem (e.g., a potential error, fraud, or illegal act). Results or relationships that are not adequately explained may indicate a situation to be communicated to senior management and the board in accordance with Standard 2060. Depending on the circumstances, the internal auditor may recommend appropriate action.
3.3 Process Mapping

Process mapping tools, including flowcharts, are discussed. In addition, interpreting charts and graphs is presented.

(a) Process Mapping

Robert Damelio identified three tools to map a process, activity, or function to understand it and to improve it. These tools include relationship maps, cross-functional process maps, and flowcharts.

- **Relationship maps** show customer–supplier relationships or linkages that exist between parts of an organization. These maps show the big-picture view that portrays how the major functions of the business interact with each other. They can also be used to show any individual function.

- **Cross-functional process maps** show how an organization’s major work processes cut across several functions. These maps show the sequence of steps that make up the work process as well as the inputs and outputs associated with each process step.

- **Flowcharts** are good to illustrate work processes since they help define, document, and analyze processes at the detailed level, especially about the individual performing the work or to develop the work procedures step by step. The next section presents flowcharts in a detailed manner.

Process maps can be used in a variety of ways, such as to:

- Orient new employees.
- Organize work.
- Clarify employee roles and contributions.
- Identify improvement opportunities.
- Reduce cycle time.
- Measure performance.

For example, cross-functional process maps and flowcharts can be used to reduce costs, reduce defects, conduct benchmarks, and reengineer a process. Similarly, relationship maps, cross-functional process maps, and flowcharts can be used to design performance measurement system and to measure customer satisfaction.

(b) Flowcharting

The three most widely used audit tools include flowcharts, questionnaires, and interviews. These tools will be discussed in more detail than other tools such as anecdotes (narratives), unobtrusive measures, and checklists.

Flowcharts are most valuable in providing a summary outline and overall description of the process of transactions in a system. The objective of a flowchart is to present a clear and concise picture and description of a system or operation, whether manual or automated. This description

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provides a basis for an understanding of information flow and for subsequent audit work required in testing and evaluating internal controls. Usually flowcharts are supplemented by other forms of documentation, such as narratives, policies and procedures, ICQs, or interviews (see Exhibit 3.9 for benefits of flowcharts).

**EXHIBIT 3.9 Benefits of Flowcharts**

Since systems are complex, it is advised to prepare flowcharts in two stages: summary level and detail level. The summary-level flowchart gives a quick synopsis of the entire system, while the detail-level flowchart is used for internal control testing and evaluation. Care should be taken to ensure that these two types of flowcharts do not contradict or duplicate each other in terms of flow of information. For example, a summary flowchart for a revenue cycle can have several detailed flowcharts, such as sales, credit, billing, and accounting receivable functions, and should not contain any unrelated functions.

When a large system is divided into several subsystems, it is important to make sure that interaction between subsystems is kept to a minimum to eliminate overlaps, errors, and confusing flow of documents. Good advice to a flowchart preparer is to keep the interfaces between documents simpler for a clear understanding.

Every flowchart should have at least three key elements: (1) departments involved or activities undertaken; (2) symbols to denote documents, nature of work done (posted, filed), and the sequence of documents related to the activities; and (3) information flow lines that show how documents and records are processed.

Flowcharts are of two types: horizontal and vertical. A flowchart is horizontal when it shows the document movement from source to final destination and from filing to destruction among departments. The information flow is from left to right. A flowchart is vertical when it shows the movement of documents from source to final destination and from filing to destruction within a department or operation. The information flow is from top to bottom. The horizontal flowchart is used to document the procedures followed by several interacting departments; the vertical flowchart does not show such interaction. The horizontal flowchart is more commonly used than the vertical one.

**QUESTIONNAIRE VERSUS FLOWCHART**

- The questionnaire is a data collection instrument—a means of gathering information about documents processed, forms used, procedures followed, record contents, program logic, and data editing details. However, questionnaires are not useful for document analysis and control evaluation purposes.
- Flowcharts overcome this weakness.
For example, flowcharts developed to describe a computer system can show programmed decisions, master file updates, and computer-generated transactions, in addition to manually generated transactions.

USES OF FLOWCHARTS

Flowcharts make it a lot simpler to see what should be happening. For example, in a computer operation, when something goes wrong, such as figures are not balancing or a job failed in the middle of processing, the flowchart is the first thing that should be checked to see where the job was or what correction needs to be made. A flowchart is a problem-solving tool since it can be used to compare what is and what should be.

For effective control evaluation, auditors need to make sure that the flowchart, whether prepared by the auditors or developed by the auditee, is in fact representative of the actual system in operation. If not, the auditors’ conclusions will be questionable. Verification is the process of ensuring that the system described in the flowchart and the actual system is the same. Verification of the transaction or the document flow can be achieved by tracing several different types of transactions or documents taken at random and walking through the entire system. This verification procedure provides a reasonably accurate description of the system and is not intended to provide any reliable information as to whether the systems are operating effectively. Verification procedures provide a partial answer in obtaining observation-type evidence.

For example, the verification procedure can be used to test a small sample of transaction posting from each book of original entry to the general ledger or to trace issuance of credit memos for goods returned by customers, price adjustments, or invoice errors.

(i) Other Uses of Flowcharts

Flowcharts are used in business functions other than auditing. Flowcharts are increasingly the focus now due to total quality management programs. Flowcharting is the most effective way to describe how a process works now, how to fix it when it does not work, and how it is going to be improved in the future. To improve a process, repetitive tasks or activities need to be looked at for streamlining, to improve consistency and quality, and to reduce confusion.

Another use of flowcharting is to improve and facilitate training. People learn more quickly with a flowchart because they can see and understand the process as a whole—a picture is worth 1,000 words.

KEY CONCEPTS TO REMEMBER: Flowcharts

- Flowcharts would most likely be used in the evaluation of controls in a complex system, not in a simple but well-documented system.
- An auditor develops a flowchart primarily to analyze a system and identify internal controls, to determine whether there is inefficiency and lack of controls.
- Flowcharts would be most appropriate during the preliminary stage of an area that has not previously been audited. Flowcharts help auditors in evaluating internal control systems.
- As a means of internal control evaluation, flowcharts allow users to follow information flow more easily than do questionnaires and descriptive narratives.
(ii) Interpreting Charts and Graphs

The basic purpose of a chart or graph is to give a visual comparison between two or more things. For example, changes in budget from one year to the next may be represented in a graph. One significant reason for visualizing a comparison is to reinforce its comprehension.

Charts and graphs are used to dramatize a statement, a fact, a point of view, or an idea. Visual aids assist in the quick comprehension of both simple and complex data, statistics, or problems.

A chart should explain itself in silence; it should be completely understood without the assistance of a caption. The caption must act only as reinforcement to its comprehension.

Various charts, such as tabular charts, column charts, bar charts, pie charts, line charts, layer charts, and radar charts are discussed briefly (see Exhibit 3.10).

EXHIBIT 3.10 Types of Charts

- Tabular (used to represent items of interest)
- Column (used for comparison of things)
- Gantt (bar) (used for milestone scheduling)
- Pie (used to represent 100% of total)
- Line (used for comparison of things)
- Layer (used for accumulation of individual facts)
- Radar (used to show gaps in performance)

The **tabular chart** is used to represent items of interest. It requires a fair amount of study in order to grasp the full meaning of the figures. This is because it takes longer to digest the meaning of an itemization of compiled figures than if the same figures are presented graphically. The **column chart** is most commonly used for demonstrating a comparison between two or more things. The column chart is vertical.

The **Gantt chart** is a bar chart and is essentially a column chart on its side; it is used for the same purpose as a column chart. The bar chart is horizontal. It is a tool that allows a manager to evaluate whether existing resources can handle work demand or whether activities should be postponed. The Gantt chart is used for milestone scheduling where each milestone has start and completion dates. A milestone represents a major activity or task to be accomplished (e.g., design phase in a computer system development project).

A Gantt chart is a graphical illustration of a scheduling technique. The structure of the chart shows output plotted against units of time. It does not include cost information. It highlights activities over the life of a project and contrasts actual times with projected times using a horizontal (bar) chart. It gives a quick picture of a project's progress in terms of actual time lines and projected time lines.

The **pie chart** is used to represent a 100% total of two or more items. The **line chart** is exceptionally impressive when comparing several things but could present a visual problem if the comparisons are too many or too close in relation to one another. Advantages are that it is simple to draw. Disadvantages are that if the lines are close to each other, it is difficult to distinguish some of the plotted points.
The **layer chart** is linear in appearance but has a different representation. It depicts the accumulation of individual facts stacked one over the other to create the overall total. This chart is more complex than the others, since it illustrates much more. In addition to showing the comparison of layers that add up to the total, this type of chart also shows how each group of layers relates to subsequent groups. The layer chart requires more work to prepare than the other charts. There is more arithmetic involved, and drawing the chart requires a good deal of concentration.

The radar chart shows gaps between current organization performance and ideal performance. The resulting chart resembles a radar screen.

### 3.4 Audit and Legal Evidence

The need for audit evidence, including types of evidence, standards of audit evidence, and appropriateness of audit evidence, is discussed. In addition, information sources for audit evidence are presented. Eight types of legal evidence, including the difference between audit evidence and legal evidence, are highlighted.

#### (a) Audit Evidence

#### (i) Types of Audit Evidence

Audit evidence is information that provides a factual basis for audit opinions. It is the information documented by the auditors and obtained through observing conditions, interviewing people, examining records, and testing documents. Audit evidence may be categorized as physical, documentary, testimonial, and analytical (see Exhibit 3.11).4

<table>
<thead>
<tr>
<th>Types of Audit Evidence</th>
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</thead>
<tbody>
<tr>
<td>Physical (direct inspection and observation)</td>
</tr>
<tr>
<td>Documentary (letters, contracts, records)</td>
</tr>
<tr>
<td>Testimonial (obtained from others)</td>
</tr>
<tr>
<td>Analytical (computations, comparisons)</td>
</tr>
</tbody>
</table>

#### Physical evidence

is obtained by direct inspection or observation of people, property, or events. Such evidence may be documented in the form of memoranda summarizing the matters inspected or observed, photographs, charts, maps, or actual samples. An auditor’s observation of the functioning of an internal control system produces physical evidence.

Examples of physical evidence include: taking a photograph of the auditees’ workplace, such as improperly stored materials or unsafe conditions; observing conditions; test counting a batch of inventory; and testing the existence of an asset.

#### Documentary evidence

consists of created information, such as letters, contracts, accounting records, invoices, and management information on performance.

Examples of documentary evidence include a page of the general ledger containing irregularities placed there by perpetrator of a fraud and determining whether erroneous billings occurred when the auditor for a construction contractor finds material costs increasing as a percentage of billings and suspects that materials billed to the company are being delivered to another contractor. A contract is the most appropriate evidence for the auditor to obtain and review when evaluating the propriety of a payment to a consultant.

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Testimonial evidence is obtained from others through statements received in response to inquiries, through interviews, or through responses to questionnaires. Testimonial evidence needs to be evaluated from the standpoint of whether the individual may be biased or have only partial knowledge about the area. Testimonial evidence obtained under conditions where persons may speak freely is more credible than testimonial evidence obtained under compromising conditions (e.g., where persons may be intimidated).

Examples of testimonial evidence include: a written, signed statement from an interviewee in response to a question asked by an auditor during an interview; a written statement by or a letter from an auditee in response to a specific inquiry made by an auditor; and a letter from the company’s attorney in response to inquiries about possible litigation.

Analytical evidence includes computations, comparisons, reasoning, and separation of information into components.

Examples of analytical evidence include: to evaluate the reasonableness of the quantity of scrap material resulting from a certain production process compared to industry standards, to evaluate the reasonableness of account balances, and concluding that there was an adequate separation of duties in the counting and recording of cash receipts.

(ii) Standards of Audit Evidence

All audit evidence should meet the three standards of sufficiency, competence, and relevance. Evidence is sufficient if it is based on facts. Competent evidence is reliable evidence. The term “relevance” refers to the relationship of the information to its use. When audit evidence does not meet these three standards, additional (corroborative) evidence is required before expressing an audit opinion (see Exhibit 3.12).

| Sufficiency (evidence is convincing) |
| Competence (evidence is reliable)    |
| Relevance (evidence is logical)      |

EXHIBIT 3.12 Standards of Evidence

(iii) Appropriateness of Audit Evidence

The phrase “appropriateness of audit evidence” refers to persuasiveness (sufficiency), relevance, and competence (reliability). The next discussion should help auditors determine what constitutes sufficient, relevant, and competent evidence to support their findings and conclusions.

Evidence is sufficient if there is enough of it to support the auditors’ findings. In determining the sufficiency of evidence, it may be helpful to ask: Is there enough evidence to persuade a reasonable person of the validity of the findings? An essential factor in evaluating the “sufficiency” of evidence is that it must be convincing enough for a prudent person to reach the same decision.

Therefore, sufficiency deals with the persuasiveness of the evidence (see Exhibit 3.13 for hierarchy of persuasive evidence). When appropriate, statistical methods may be used to establish sufficiency. When sampling methods are used, the concept of sufficiency of evidence means that the samples selected provide reasonable assurance that they are representative of the sampled population. Interviewing the auditee is not enough to provide sufficient evidence.
Some examples of sufficient evidence are listed next.

- Verifying the quantity of fixed assets on hand by physical observation would provide the most persuasive evidence of quantity on hand.

- Using test data, an auditor has processed both normal and atypical transactions through a computerized payroll system to test calculations of regular and overtime pay amounts. Sufficient competent evidence of controls exists if test data results are compared to predetermined results or expectations.

- The audit procedure that provides the most persuasive evidence about the loan’s collectibility is to examine the documentation of a recent, independent appraisal of the real estate that was used a security.

- The most persuasive evidence that the incoming supply counts are made by the receiving department is a periodic observation by the internal auditor over the course of the audit.

- A positive confirmation received directly from the customer is the most persuasive evidence concerning the existence and valuation of a receivable.

- If the audit objective is to gain evidence that payment actually has been made for a specific invoice from a vendor, the most persuasive evidence would be obtained by a canceled check, made out to the vendor and referenced to the invoice, included in a cutoff bank statement that the auditor received directly from the bank.

- If an auditor wants assurance of the existence of inventory stored in a warehouse, the most persuasive evidence is to physically observe the inventory in the warehouse.

- Externally prepared documents (e.g., invoice) would provide the most persuasive evidence regarding an asset value that was acquired.

- A physical examination would provide the most persuasive evidence for testing the existence of an asset.

Evidence used to support a finding is **relevant** if it has a logical, sensible relationship to that finding. Relevant evidence is consistent with the audit objectives and supports audit findings and recommendations. Evidence is **competent** to the extent that it is consistent with fact (i.e., evidence is competent if it is valid). Competent evidence is satisfied by an original signed document, but copies do not provide competent evidence. Evidence that is both available and reliable is competent. Competent information is reliable and the best available through the use of appropriate audit functions.
The next presumptions are useful in judging the competence of evidence. However, these presumptions are not to be considered sufficient in themselves to determine competence.

- Evidence obtained from a credible independent source is more competent than that secured from the audited organization. An external source of evidence should impact audit conclusions most.

- Evidence developed under an effective system of management controls is more competent than that obtained where such control is weak or nonexistent.

- Evidence obtained through the auditors’ direct physical examination, observation, computation, and inspection is more competent than evidence obtained indirectly. An example of external and internal evidence is when an auditor reviews the count sheets, inventory printouts, and memos from the last inventory during determination of causes of inventory shortages shown by the physical inventories.

Examples of competent evidence are listed next.

- An audit objective of an accounts receivable function is to determine if prescribed standard procedures are followed when credit is granted. An audit procedure providing the most competent evidence would be selecting a statistical sample of credit applications and testing them for conformance with prescribed procedures.

- The most “reliable” (competent) evidence of determining a company’s legal title to inventories is paid vendor invoices.

- A contract dispute has arisen between a company and a major supplier. To resolve the dispute, the most competent evidence would be the original contract.

- A positive confirmation of an accounts receivable that proves that it actually exists is competent evidence.

- In deciding whether recorded sales are valid, most “competent” evidence would be obtained by looking at the shipping document, the independent bill of lading, and the invoice for the merchandise.

Auditors should, when they deem it useful, obtain from officials of the audited entity written representations concerning the competence of the evidence they obtain. Written representations ordinarily confirm oral representations given to the auditor, indicate and document the continuing appropriateness of such representations, and reduce the possibility of misunderstandings concerning the matters that are the subject of the representations.

An example of relevant evidence is aging of accounts receivables, which provides relevant evidence regarding the validity of receivables and thus the allowance account.

(iv) Information Sources for Audit Evidence

The auditors’ approach to determining the sufficiency, relevance, and competence of evidence depends on the source of the information that constitutes the evidence (see Exhibit 3.14). Information sources include original data gathered by auditors and existing data gathered by either the auditee or a third party. Data from any of these sources may be obtained from computer-based systems.
(A) Data Gathered by the Auditors Data gathered by the auditors include the auditors’ own observations and measurements. Among the methods for gathering these types of data are questionnaires, structured interviews, and direct observations. The design of these methods and the skill of the auditors applying them are the keys to ensuring that these data constitute sufficient, competent, and relevant evidence. When these methods are applied to determine cause, auditors are concerned with eliminating rival explanations of cause. Doing so involves considering three types of validity: (1) internal validity, (2) construct validity, and (3) external validity.

1. Internal validity means that A (the program as defined for the particular audit) caused B (the effect measured in the audit).

2. Construct validity refers to whether the auditors are measuring or observing what they intend to.

3. External validity refers to the ability to generalize the auditors’ findings to a broader universe.

(B) Data Gathered by the Auditee Auditors can use data gathered by the auditee as part of their evidence. If those data are significant to the overall body of evidence supporting their findings, auditors should obtain additional evidence regarding the reliability of those data. Statements by auditee management or personnel about the reliability of operations data should be corroborated with other evidence. Auditors can obtain the necessary evidence by testing the effectiveness of the entity’s controls over the reliability of the data, by direct tests of the data, or by a combination of the two.

When auditors’ tests of data disclose errors in that data, the auditors should consider the significance of those errors in relation to the audit objectives. If the auditors conclude that these errors are so significant that the data are not valid or reliable, they should consider whether to:

- Seek evidence from other sources.
- Redefine the audit’s objectives to eliminate the need to use the invalid or unreliable data.
- Use the data, but clearly indicate in their report the data’s limitations and refrain from making unwarranted conclusions or recommendations.

Similar considerations apply when the auditors are unable to obtain sufficient, competent, and relevant evidence about the validity and reliability of the auditee’s data.

(C) Data Gathered by Third Parties The auditors’ evidence may also include data gathered by third parties. In some cases, these data may already have been audited, or the auditors may be able to audit this evidence themselves. Often, however, it is not practical to obtain evidence of the data’s validity and reliability.
How the use of unaudited third-party data affects the auditors’ report depends on the data’s significance to the overall body of evidence supporting the auditors’ findings. If it is significant, the auditors should clearly indicate in their report the data’s limitations and refrain from making unwarranted conclusions or recommendations based on those data.

(D) Data Gathered from Computer-Based Systems  Auditors should obtain sufficient evidence that computer-processed data are valid and reliable when those data are significant to the overall body of evidence supporting the auditors’ findings and any conclusions or recommendations. (When the reliability of a computer-based system is the primary objective of the audit, the auditor should conduct a review of the system’s general and application controls.) This is necessary regardless of whether the data are provided to auditors or auditors independently extract them. (When the auditor uses computer-processed data or includes them in the report for background or information purposes, and when those data are not significant to the auditor’s results, citing the source of the data and stating that they were not verified will satisfy the reporting standards for accuracy and completeness.)

Auditors should determine if other auditors have worked to establish the validity and reliability of the data or the effectiveness of the controls over the system that produced it. If they have, auditors may be able to use that work. If not, auditors can obtain evidence about the validity and reliability of computer-processed data from tests of general and application controls, direct tests of the data, or a combination of both.

(b) Legal Evidence

Eight types of legal evidence exist, which are described below (see Exhibit 3.15). Both legal evidence and audit evidence have common objectives of providing proof and fostering an honest belief about the truth or falsity of any proposition at issue. The focus of audit evidence differs somewhat from that of legal evidence. Legal evidence relies heavily on oral testimony. Audit evidence relies more on documentary evidence. Legal evidence permits certain presumptions. Audit evidence is not bound by any presumptions. This requires auditors to question all evidence until they, themselves, are satisfied with its truth or falsity.

| 1. Best evidence (the most satisfactory proof of the fact and provides primary evidence) |
| 2. Secondary evidence (inferior to primary evidence and cannot be relied upon) |
| 3. Direct evidence (no presumptions or inferences are required) |
| 4. Circumstantial evidence (does not directly prove the existence of the primary fact) |
| 5. Conclusive evidence (only one conclusion can be drawn and needs no corroboration) |
| 6. Corroborative evidence (additional evidence of a different character) |
| 7. Opinion evidence (based on seeing or hearing and expert opinion is permitted) |
| 8. Hearsay evidence (secondhand evidence; not admissible) |

EXHIBIT 3.15 Eight Forms of Legal Evidence

(i) Best Evidence
Best evidence is often referred to as primary evidence and is the evidence that is the most natural and reliable. It is confined to documentary evidence and applies to proof of the content in writing. Oral evidence may not be used to dispute a written instrument such as a contract or a deed; however, oral evidence can be used to explain the meaning of the instrument where such an instrument is capable of more than one interpretation.

Examples of best evidence are listed next.

- The audit procedure providing the best evidence about the collectibility of notes receivable would be an examination of cash receipts records to determine promptness of interest and principal payments.
- Reconciling shipping records to recorded sales is a substantive fieldwork procedure providing best evidence about the completeness of recorded revenues.
- The best evidence in assessing the acceptability of various benefit programs to employees is to evaluate program participation ratios and their trends during an audit of the personnel function, where participation in some of these benefit programs is optional.
- In testing the write-off of a deteriorated piece of equipment, the best evidence of the condition of the equipment would be a physical inspection of the actual piece of equipment.

(ii) Secondary Evidence
Secondary evidence is inferior to primary evidence and cannot be given the same reliance. Examples include a copy of a writing or oral evidence of its contents. A copy of writing is permissible when the original is lost, destroyed, or controlled by a public entity.

(iii) Direct Evidence
Direct evidence proves a fact without having to use presumptions or inference to establish that proof. The testimony of a witness to a fact is direct evidence. The most likely source of evidence indicating employee theft of inventory would be a warehouse employee’s verbal charge of theft.

(iv) Circumstantial Evidence
Circumstantial evidence proves an intermediate fact(s) from which one can infer the existence of some primary fact that is significant to the issue under consideration. It provides a logical inference that it exists.

(v) Conclusive Evidence
Conclusive evidence is incontrovertible evidence, irrespective of its nature. It is so strong that it overbears all other evidence. It cannot be contradicted and needs no corroboration.

(vi) Corroborative Evidence
Corroborative evidence is additional evidence of a different character concerning the same point. It is evidence supplementary to that already given and tends to strengthen or confirm it.

Examples of corroborative evidence are listed next.

- Salespersons often order inventory for stock without receiving the approval of the vice president of sales, and a detail testing showed that there are no written approvals on purchase orders for replacement parts. Detail testing is a good example of corroborative evidence.
- Interviews should be corroborated by gathering objective data.
(vii) Opinion Evidence
The opinion rule holds that witnesses must ordinarily testify to fact only—to what they actually saw or heard. Opinions may be biased, self-serving, or uninformed. However, experts are permitted to offer an opinion based on the facts.

(viii) Hearsay Evidence
The hearsay rule renders objectionable any statements made by someone, other than a witness, to prove the truth of the matter stated. It refers to any oral or written evidence brought into court and offered as proof of things said out of court.

Business documents (e.g., sales slips, purchase orders) made during regular business routines are admissible. Photographs represent hearsay evidence but are considered admissible if properly authenticated by witnesses who are familiar with the subject.