

Unit – 3

Analysis

Introduction

- Analysis is the first systems development life cycle (SDLC) phase where you begin to understand, in depth, the need for system changes.
- Systems analysis involves a substantial **amount of effort and cost**, and is therefore undertaken only after management has decided that the systems development project under consideration has merit and should be pursued through this phase.
- Most observers would agree that many of the errors in developed systems are directly traceable to **inadequate efforts** in the analysis and design phases of the life cycle.
- The purpose of analysis is to determine what information and information processing services are needed to support selected objectives and functions of the organization. **Gathering this information is called requirements determination.**

Introduction

- The **results of the requirements determination** can be structured according to three essential views of the current and replacement information systems:
- **Process:** The sequence of data movement and handling operations within the system.
- **Logic and timing:** The rules by which data are transformed and manipulated and an indication of what triggers data transformation.
- **Data:** The inherent structure of data independent of how or when they are processed.

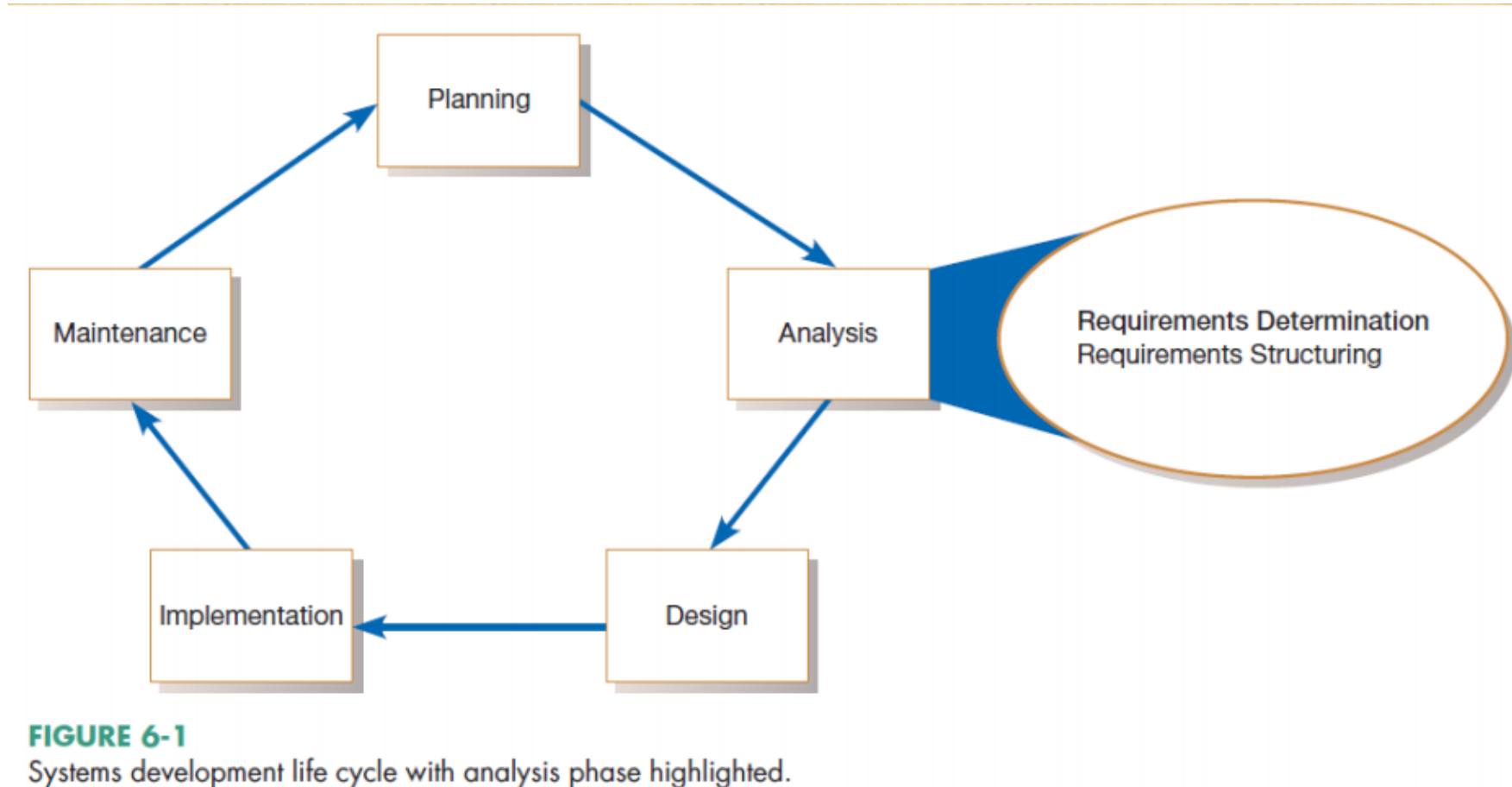
Determining System Requirements

- Introduction: Systems analysis is the part of the systems development life cycle in which you **determine how the current information system functions and assess what users would like to see in a new system.**
- Analysis has two sub phases:
 - requirements determination and
 - requirements structuring.

Determining System Requirements

- In this chapter, you will learn about determining system requirements. Techniques used in requirements determination have evolved over time to become more structured and increasingly rely on computer support.
- **traditional requirements determination methods, including interviewing, observing users in their work environment, and collecting procedures and other written documents.**
- We will then discuss more current methods for **collecting system requirements.**
- The first of these methods is Joint Application Design (JAD).
- Next, you will read about how analysts rely more and more on information systems to help them perform analysis.
- As you will see, CASE tools, discussed in Chapter 1, are useful in requirements determination, and prototyping has become a key tool for some requirements determination efforts.
- Finally, you will learn how requirements analysis continues to be an important part of systems analysis and design, whether the approach involves business process redesign, new Agile techniques (such as constant user involvement or usage-centered design), or focuses on developing Internet applications.

Performing Requirements Determination



Performing Requirements Determination

- As shown in Figure 6-1, there are two subphases to systems analysis:
 - requirements determination and
 - requirements structuring.
- We will address these as separate steps, but you should consider the steps as parallel and iterative.
- For example, as you determine some aspects of the current and desired system(s), you begin to structure these requirements or build prototypes to show users how a system might behave. Inconsistencies and deficiencies discovered through structuring and prototyping lead you to explore further the operation of current system(s) and the future needs of the organization. Eventually, your ideas and discoveries converge in a thorough and accurate depiction (the way that something is represented or shown) of current operations and requirements for the new system.

Characteristics

- **Impertinence:** (When you interrupt your boss when he is talking to you, this is an example of impertinence)
 - You should question everything. You need to ask questions such as:
 - Are all transactions processed the same way?
 - Could anyone be charged something other than the standard price?
 - Might we someday want to allow and encourage employees to work for more than one department?
- **Impartiality:** Your role is to find the best solution to a business problem or opportunity. It is not, for example, to find a way to justify the purchase of new hardware or to insist on incorporating what users think they want into the new system requirements. You must consider issues raised by all parties and try to find the best organizational solution.

Characteristics

- **Relax constraints:** Assume that anything is possible and eliminate the infeasible.
 - For example, do not accept this statement: “We’ve always done it that way, so we have to continue the practice.” Traditions are different from rules and policies.
 - Traditions probably started for a good reason but, as the organization and its environment change, they may turn into habits rather than sensible procedures.
- **Attention to details:** Every fact must fit with every other fact.
 - One element out of place means that even the best system will fail at some time.
 - For example, an imprecise (not accurate or exact) definition of who a customer is may mean that you purge (remove) customer data when a customer has no active orders, yet these past customers may be vital contacts for future sales.

Characteristics

- **Reframing:**
 - Analysis is, in part, a creative process. You must challenge yourself to look at the organization in new ways. You must consider how each user views his or her requirements. You must be careful not to jump to the following conclusion: “I worked on a system like that once—this new system must work the same way as the one I built before.”
- **Deliverables and outcomes:**
 - The primary deliverables from requirements determination are the various forms of information gathered during the determination process: transcripts of interviews; notes from observation and analysis of documents; sets of forms, reports, job descriptions, and other documents; and computer-generated output such as system prototypes.
 - In short, anything that the analysis team collects as part of determining system requirements is included in the deliverables resulting from this sub phase of the systems development life cycle. Table 6-1 lists examples of some specific information that might be gathered during requirements determination.

Characteristics

- **Too much analysis is not productive**, and the term analysis paralysis has been coined (invented) to describe a systems development project that has become bogged down (to be/become so involved in something difficult or complicated that you cannot do anything else) in an abundance of analysis work.
- Because of the dangers of excessive analysis, today's systems analysts focus more on the system to be developed than on the current system.
- The techniques you will learn about later in this chapter, JAD and prototyping, were developed to keep the analysis effort at a minimum yet still keep it effective.
- Newer techniques have also been developed to keep requirements determination fast and flexible, including continual user involvement, usage centered design, and the Planning Game from eXtreme Programming.

Traditional Methods for determining requirements

TABLE 6-2 Traditional Methods of Collecting System Requirements

- Individually interview people informed about the operation and issues of the current system and future systems needs
- Interview groups of people with diverse needs to find synergies and contrasts among system requirements
- Observe workers at selected times to see how data are handled and what information people need to do their jobs
- Study business documents to discover reported issues, policies, rules, and directions as well as concrete examples of the use of data and information in the organization

Traditional Methods for determining requirements

- At the core of systems analysis is the collection of information. At the outset, you must **collect information about the information systems that are currently being used** and how users would like to improve the current systems and organizational operations with new or replacement information systems. One of the best ways to get this information is **to talk to the people who are directly or indirectly** involved in the different parts of the organizations affected by the possible system changes: users, managers, funders, and so on. Another way to find out about the current system is to gather copies of documentation relevant to current systems and business processes.
- In this chapter, you will learn about various ways to get information directly from stakeholders: interviews, group interviews, the Nominal Group Technique, and direct observation. You will learn about collecting documentation on the current system and organizational operation in the form of written procedures, forms, reports, and other hard copy. These traditional methods of collecting system requirements are listed in Table 6-2.

Interviewing and Listening

- Interviewing is one of the primary ways analysts gather information about an information systems project.
- Early in a project, an analyst may spend a large amount of time interviewing people about their work, the information they use to do it, and the types of information processing that might supplement their work.
- Other stakeholders are interviewed to understand organizational direction, policies, expectations managers have on the units they supervise, and other non routine aspects of organizational operations.
- During interviewing you will gather facts, opinions, and speculation(Guess, when you guess possible answers to a question without having enough information to be certain) and observe body language, emotions, and other signs of what people want and how they assess current systems.
- There are many ways to effectively interview someone, and no one method is necessarily better than another. Some guidelines you should keep in mind when you interview, summarized in Table 6-3, are discussed next.

Interviewing and Listening

TABLE 6-3 **Guidelines for Effective Interviewing**

Plan the Interview

- Prepare interviewee: appointment, priming questions
- Prepare checklist, agenda, and questions

**Listen carefully and take notes
(record if permitted)**

**Review notes within 48 hours of
interview**

Be neutral

Seek diverse views

Interviewing and Listening

Interview Outline	
Interviewee: <i>Name of person being interviewed</i>	Interviewer: <i>Name of person leading interview</i>
Location/Medium: <i>Office, conference room, or phone number</i>	Appointment Date: Start Time: End Time:
Objectives: <i>What data to collect On what to gain agreement What areas to explore</i>	Reminders: <i>Background/experience of interviewee Known opinions of interviewee</i>
Agenda: Introduction Background on Project Overview of Interview Topics to Be Covered Permission to Record Topic 1 Questions Topic 2 Questions ... Summary of Major Points Questions from Interviewee Closing	Approximate Time: 1 minute 2 minutes 1 minute 5 minutes 7 minutes ... 2 minutes 5 minutes 1 minute
General Observations: <i>Interviewee seemed busy probably need to call in a few days for follow-up questions because he gave only short answers. PC was turned off—probably not a regular PC user.</i>	

Interviewing and Listening

Unresolved Issues, Topics Not Covered:

He needs to look up sales figures from 1999. He raised the issue of how to handle returned goods, but we did not have time to discuss.

Interviewee:

Date:

Questions:

Notes:

When to ask question, if conditional
Question: 1

Have you used the current sales tracking system? If so, how often?

Answer

Yes, I ask for a report on my product line weekly.

Observations

Seemed anxious — may be overestimating usage frequency.

If yes, go to Question 2

Question: 2

What do you like least about the system?

Answer

Sales are shown in units, not dollars.

Observations

System can show sales in dollars, but user does not know this.

Choosing Interview Questions

- You need to decide what mix and sequence of openended and closed-ended questions you will use. Open-ended questions are usually used to probe for information for which you cannot anticipate all possible responses or for which you do not know the precise question to ask.
- The person being interviewed is encouraged to talk about whatever interests him or her within the general bounds of the question. An example is, “What would you say is the best thing about the information system you currently use to do your job?” or “List the three most frequently used menu options.” You must react quickly to answers and determine whether or not any follow-up questions are needed for clarification or elaboration. Sometimes body language will suggest that a user has given an incomplete answer or is reluctant to divulge (to make something secret known) some information; a follow-up question might yield additional insight.
- One advantage of open-ended questions is that previously unknown information can surface. You can then continue exploring along unexpected lines of inquiry to reveal even more new information. Open-ended questions also often put the interviewees at ease (move) because they are able to respond in their own words using their own structure; open-ended questions give interviewees more of a sense of involvement and control in the interview.
- A major disadvantage of openended questions is the length of time it can take for the questions to be answered. In addition, open-ended questions can be difficult to summarize.

Choosing Interview Questions

- Closed-ended questions provide a range of answers from which the interviewee may choose.
- Here is an example:
 - Which of the following would you say is the one best thing about the information system you currently use to do your job (pick only one)?
 - a. Having easy access to all of the data you need
 - b. The system's response time
 - c. The ability to access the system from remote locations
- Closed-ended questions work well when the major answers to questions are well known. Another plus is that interviews based on closed-ended questions do not necessarily require a large time commitment—more topics can be covered. You can see body language and hear voice tone, which can aid in interpreting the interviewee's responses. Closed-ended questions can also be an easy way to begin an interview and to determine which line of open-ended questions to pursue. You can include an "other" option to encourage the interviewee to add unanticipated responses. A major disadvantage of closed-ended questions is that useful information that does not quite fit into the defined answers may be overlooked as the respondent tries to make a choice instead of providing his or her best answer.

Choosing Interview Questions

- • **Closed-ended questions**, like objective questions on an examination, can follow several forms, including the following choices:
 - • True or false.
 - • Multiple choice (with only one response or selecting all relevant choices).
 - • Rating a response or idea on a scale, say from bad to good or strongly agree to strongly disagree. Each point on the scale should have a clear and consistent meaning to each person, and there is usually a neutral point in the middle of the scale.
 - • Ranking items in order of importance.

Choosing Interview Questions

- **Interview Guidelines:** First, with either open- or closed-ended questions, do not phrase a question in a way that implies a right or wrong answer. The respondent must feel that he or she can put his or her true opinion and perspective and that his or her idea will be considered equally with those of others. Questions such as “Should the system continue to provide the ability to override the default value, even though most users now do not like the feature?”.
- **The second** guideline to remember about interviews is to listen very carefully to what is being said. Take careful notes or, if possible, record the interview (be sure to ask permission first!). The answers may contain extremely important information for the project.
- **Third**, once the interview is over, go back to your office and type up your notes within 48 hours. If you recorded the interview, use the recording to verify the material in your notes. After 48 hours, your memory of the interview will fade quickly. As you type and organize your notes, write down any additional questions that might arise from lapses (a temporary failure) in your notes or from ambiguous information.

Choosing Interview Questions

- Make a list of unclear points that need clarification. Call the person you interviewed and get answers to these new questions. Use the phone call as an opportunity to verify the accuracy of your notes. You may also want to send a written copy of your notes to the person you interviewed so the person can check your notes for accuracy. Finally, make sure you thank the person for his or her time.
- • **Fourth**, be careful during the interview not to set expectations about the new or replacement system unless you are sure these features will be part of the delivered system. Let the interviewee know that there are many steps to the project and the perspectives of many people need to be considered, along with what is technically possible. Let respondents know that their ideas will be carefully considered, but that due to the iterative nature of the systems development process, it is premature to say now exactly what the ultimate system will or will not do.

Choosing Interview Questions

- **Fifth**, seek a variety of perspectives from the interviews. Find out what potential users of the system, users of other systems that might be affected by changes, managers and superiors, information systems staff who have experience with the current system, and others think the current problems and opportunities are and what new information services might better serve the organization.
- • **Interviewing groups:** One drawback to using interviews to collect systems requirements is the need for the analyst to reconcile (reconsider) apparent contradictions in the information collected. A series of interviews may turn up inconsistent information about the current system or its replacement. You must work through all of these inconsistencies to figure out what might be the most accurate representation of current and future systems. Such a process requires several follow-up phone calls and additional interviews. Catching important people in their offices is often difficult and frustrating, and scheduling new interviews may become very time consuming. Clearly, gathering information about an information system through a series of individual interviews and follow-up calls is not an efficient process.

Choosing Interview Questions

- Another option available to you is the group interview. In a group interview, several key people are interviewed at once. To make sure all of the important information is collected, you may conduct the interview with one or more analysts. In the case of multiple interviewers, one analyst may ask questions while another takes notes, or different analysts might concentrate on different kinds of information. For example, one analyst may listen for data requirements while another notes the timing and triggering of key events. The number of interviewees involved in the process may range from two to however many you believe can be comfortably accommodated.
- • A group interview has a few advantages. One, it is a much more effective use of your time than a series of interviews with individuals (although the time commitment of the interviewees may be more of a concern). Two, interviewing several people together allows them to hear the opinions of other key people and gives them the opportunity to agree or disagree with their peers. Synergies (the combined power of a group of things when they are working together which is greater than the total power achieved by each working separately) also often occur. For example, the comments of one person might cause another person to say, “That reminds me of” or “I didn’t know that was a problem.” You can benefit from such a discussion as it helps you identify issues on which there is general agreement and areas where views diverge widely.

Choosing Interview Questions

- The primary disadvantage of a group interview is the difficulty in scheduling it. The more people who are involved, the more difficult it will be finding a convenient time and place for everyone. Modern videoconferencing technology can minimize the geographical dispersion factors that make scheduling meetings so difficult. Group interviews are at the core of the JAD process, which we discuss in a later section in this chapter. A specific technique for working with groups, Nominal Group Technique, is discussed next.

Nominal Group Technique

- Many different techniques have been developed over the years to improve the process of working with groups.
- One of the more popular techniques for generating ideas among group members is called Nominal Group Technique (NGT).
- NGT is exactly what the name indicates—the individuals working together to solve a problem are a group in name only, or nominally.
- Group members may be gathered in the same room for NGT, but they all work alone for a period of time.
- Typically, group members make a written list of their ideas. At the end of the idea-generation time, group members pool their individual ideas under the guidance of a trained facilitator. Pooling usually involves having the facilitator ask each person in turn for an idea that has not been presented before. As the person reads the idea aloud, someone else writes down the idea on a blackboard or flip chart.
- • After all of the ideas have been introduced, the facilitator will then ask for the group to openly discuss each idea, primarily for clarification.

Nominal Group Technique(site note)

Press Esc to exit full screen

- A nominal group exists in name only, & the members have minimal interaction prior to making decisions.
- Process:
 - 1) Members brought together & presented the problem.
 - 2) Each members develops solution / ideas independently & writes them on cards.
 - 3) All present their ideas in a round-robin procedure.
 - 4) Brief time is allotted to clarify ideas, after the presentation by all.
 - 5) Group members individually rank their preferences for the best alternatives by secret ballot.
 - 6) Group decision is announced based on this ranking.

Nominal Group Technique

- Once all of the ideas are understood by all of the participants, the facilitator will try to reduce the number of ideas the group will carry forward for additional consideration.
- There are many ways to reduce the number of ideas. The facilitator may ask participants to choose only a subset of ideas that they believe are important.
- Then the facilitator will go around the room, asking each person to read aloud an idea that is important to him or her that has not yet been identified by someone else. Or the facilitator may work with the group to identify and either eliminate or combine ideas that are very similar to others.
- At some point, the facilitator and the group end up with a tractable set of ideas, which can be further prioritized. In a requirements determination context, the ideas being sought in an NGT exercise would typically apply to problems with the existing system or ideas for new features in the system being developed.

Directly Observing Users

- For example, observation can cause people to change their normal operating behavior.
- Employees who know they are being observed may be nervous and make more mistakes than normal, may be careful to follow exact procedures they do not typically follow, and may work faster or slower than normal.
- Moreover, because observation typically cannot be continuous, you receive only a snapshot image of the person or task you observe, which may not include important events or activities.
- Because observation is very time consuming, you will not only observe for a limited time, but also a limited number of people and a limited number of sites.
- Again, observation yields only a small segment of data from a possibly vast variety of data sources.
- Exactly which people or sites to observe is a difficult selection problem. You want to pick both typical and atypical people and sites, and observe during normal and abnormal conditions and times to receive the richest possible data from observation.

Analyzing Procedures and Other Documents

- By examining existing system and organizational documentation, system analyst can find out details about current system and the organization.
- In documents analyst can find information, such as problem with existing systems, opportunities to meet new needs if only certain information or information processing were available, organizational direction that can influence information system requirements, and the reason why current systems are designed as they are etc.
- However, when analyzing those official documentations analyst should pay attention to the difference between the systems described on the official documentation and practical systems in real world.
- For the reason of inadequacies (not enough or small in amount) of formal procedures, individual work habits and preferences, resistance to control, and other factors, the difference between so called formal system and informal system universally exists.
- In documents you can find information about

Analyzing Procedures and Other Documents

- Problems with existing systems (e.g., missing information or redundant steps)
- • Opportunities to meet new needs if only certain information or information processing were available (e.g., analysis of sales based on customer type)
- • Organizational direction that can influence information system requirements (e.g., trying to link customers and suppliers more closely to the organization)
- • Titles and names of key individuals who have an interest in relevant existing systems (e.g., the name of a sales manager who led a study of the buying behavior of key customers)
- • Values of the organization or individuals who can help determine priorities for different capabilities desired by different users (e.g., maintaining market share even if it means lower short-term profits)
- • Special information processing circumstances that occur irregularly that may not be identified by any other requirements determination technique (e.g., special handling needed for a few large-volume customers that requires use of customized customer ordering procedures)

Analyzing Procedures and Other Documents

- The reason why current systems are designed as they are, which can suggest features left out of current software, which may now be feasible and more desirable (e.g., data about a customer's purchase of competitors' products were not available when the current system was designed; these data are now available from several sources)
- • Data, rules for processing data, and principles by which the organization operates that must be enforced by the information system (e.g., each customer is assigned exactly one sales department staff member as a primary contact if the customer has any questions)

Contemporary Methods For Determining System Requirements

- Even though we called interviews, observation, and document analysis traditional methods for determining a system's requirements, all of these methods are still very much used by analysts to collect important information.
- **Today, however, there are additional techniques to collect information about the current system, the organizational area requesting the new system, and what the new system should be like.**
- • In this section, you will learn about several contemporary information gathering techniques for analysis (listed in Table 6-5): JAD, CASE tools to support JAD, and prototyping.
- • As we said earlier, these techniques can support effective information collection and structuring while reducing the amount of time required for analysis.

Contemporary Methods For Determining System Requirements

TABLE 6-5 Contemporary Methods for Collecting System Requirements

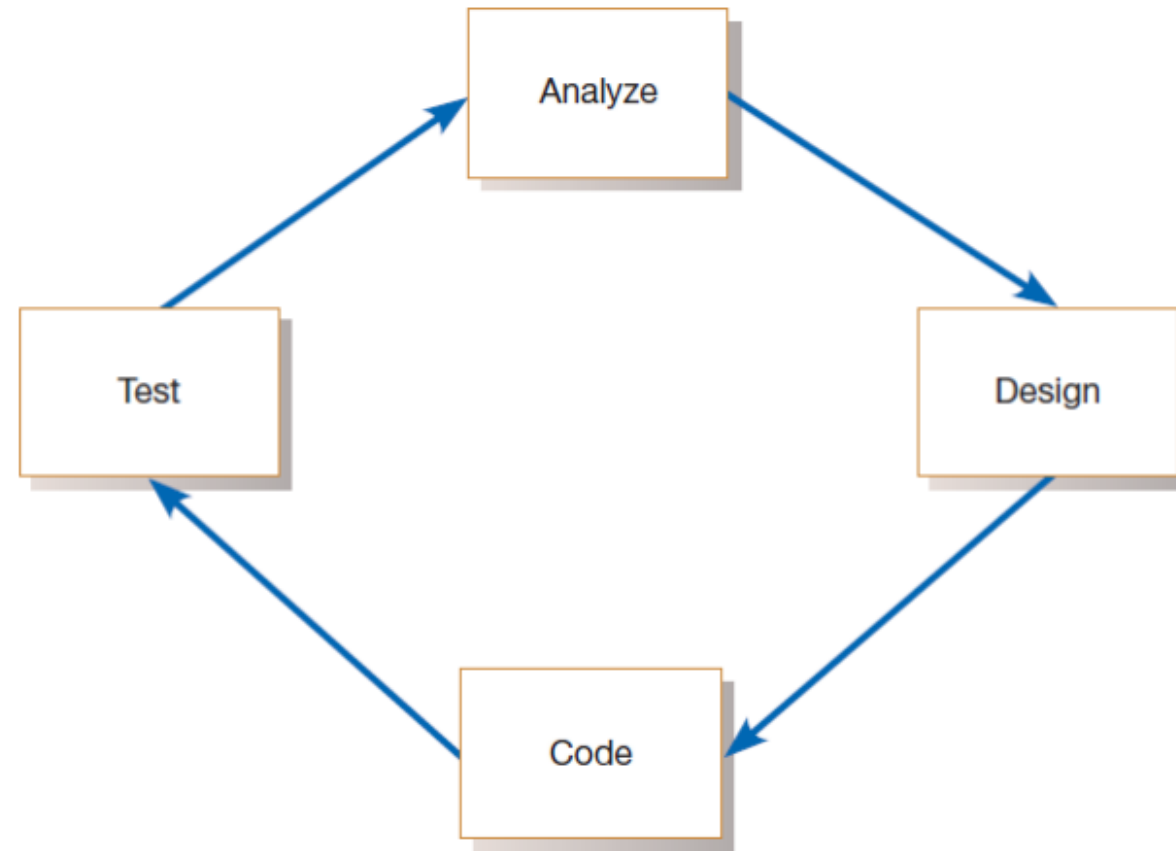
- Bringing session users, sponsors, analysts, and others together in a JAD session to discuss and review system requirements
- Using *CASE tools* during a JAD to analyze current systems to discover requirements that will meet changing business conditions
- Iteratively developing system *prototypes* that refine the understanding of system requirements in concrete terms by showing working versions of system features

Radical Methods For Determining System Requirements

- The overall process by which current methods are replaced with radically new methods is generally referred to as business process reengineering (BPR).
- • To better understand BPR, consider the following analogy. Suppose you are a successful European golfer who has tuned your game to fit the style of golf courses and weather in Europe.
- You have learned how to control the flight of the ball in heavy winds, roll the ball on wide open greens, putt on large and undulating greens, and aim at a target without the aid of the landscaping common on North American courses.
- When you come to the United States to make your fortune on the US tour, you discover that incrementally improving your putting, driving accuracy, and sand shots will help, but the new competitive environment is simply not suited to your style of the game.
- You need to reengineer your whole approach, learning how to aim at targets, spin and stop a ball on the green, and manage the distractions of crowds and the press.
- If you are good enough, you may survive, but without reengineering, you will never be a winner

Requirements Determination Using Agile Methodologies

- Three techniques are presented in this section. The first is continual user involvement in the development process, a technique that works especially well with small and dedicated development teams.
- • The second approach is a JAD-like process called Agile Usage-Centered Design.
- • The third approach is the Planning Game, which was developed as part of eXtreme Programming.
- • (1) Continual User Involvement
- • In Chapter 1, we read about the criticisms of the traditional waterfall SDLC. One of those criticisms was that the waterfall SDLC allowed users to be involved in the development process only in the early stages of analysis. Once requirements had been gathered from them, the users were not involved again in the process until the system was being installed and they were asked to sign off on it. Typically, by the time the users saw the system again, it was nothing like what they had imagined. The system most likely did not adequately address user needs



- Continual user involvement was a key aspect of the success of Boeing's Wire Design and Wire Install system for the 757 aircraft (Bedoll, 2003). The system was intended to support engineers who customize plane configurations for customers, allowing them to analyze all 50,000 wires that can possibly be installed on a 757. A previous attempt at building a similar system took over three years, and the resulting system was never used.
- The second attempt, relying on Agile Methodologies, resulted in a system that was in production after only six weeks. One of the keys to success was a user liaison (communication between people who work with each other) who spent half of his time with the small development team and half with the other end users. In addition to following the analysis–design–code–test cycle, the team also had weekly production releases. The user liaison was involved every step of the way. Obviously, for such a requirements determination to succeed, the user who works with the development team must be very knowledgeable, but he or she must also be in a position to give up his or her normal business responsibilities in order to become heavily involved in the system's development.

Agile Usage-Centered Design

- Continual user involvement in systems development is an excellent way to ensure that requirements are captured accurately and immediately implemented in system design. However, such constant interaction works best when the development team is small, as was the case in the Boeing example. Also, it is not always possible to have continual access to users for the duration of a development project. Thus, Agile developers have come up with other means for effectively involving users in the requirements determination process. One such method is called Agile Usage-Centered Design, originally developed by Larry Constantine (2002) and adapted for Agile Methodologies by Jeff Patton (2002).