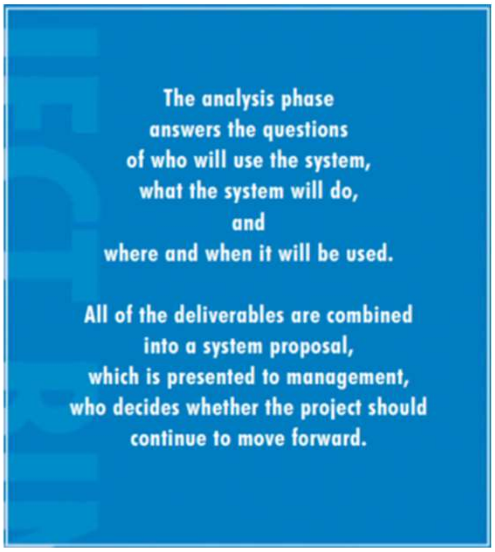
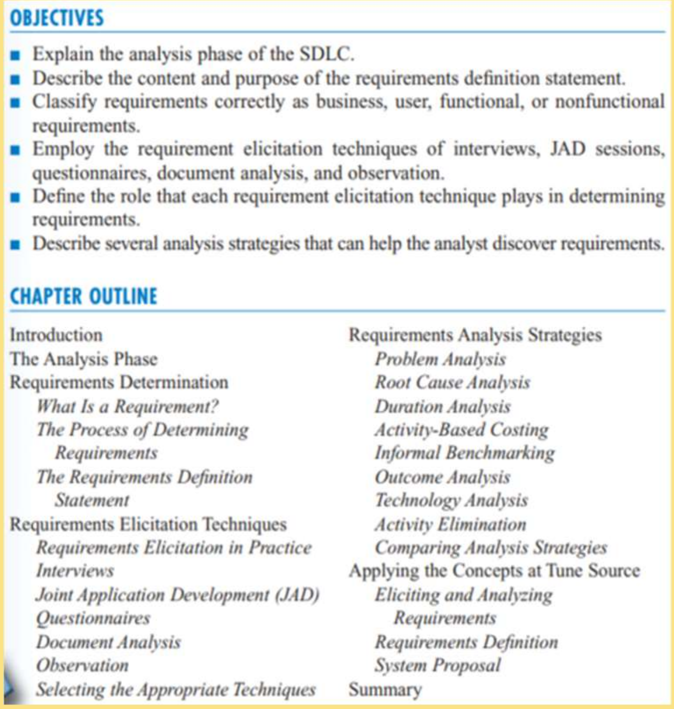


The analysis phase
answers the questions
of who will use the system,
what the system will do,
and
where and when it will be used.

All of the deliverables are combined
into a system proposal,
which is presented to management,
who decides whether the project should
continue to move forward.

42

Chapter 3: REQUIREMENTS DETERMINATION



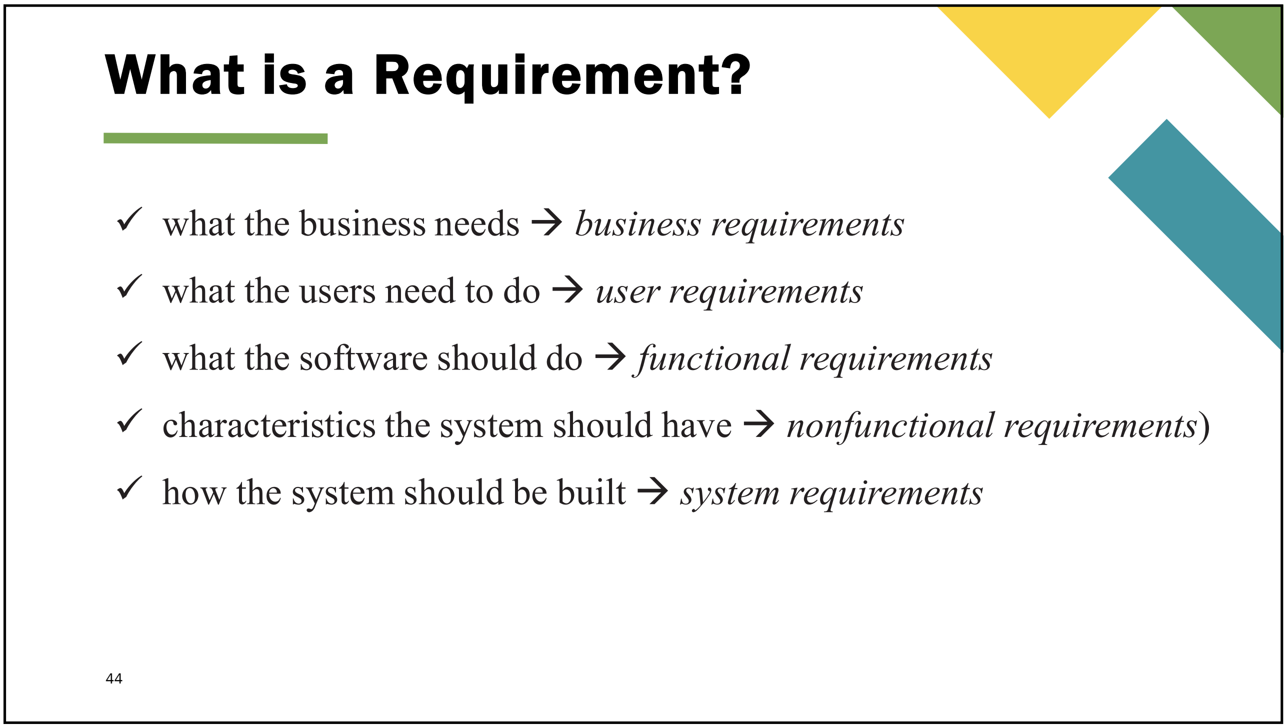
OBJECTIVES

- Explain the analysis phase of the SDLC.
- Describe the content and purpose of the requirements definition statement.
- Classify requirements correctly as business, user, functional, or nonfunctional requirements.
- Employ the requirement elicitation techniques of interviews, JAD sessions, questionnaires, document analysis, and observation.
- Define the role that each requirement elicitation technique plays in determining requirements.
- Describe several analysis strategies that can help the analyst discover requirements.

CHAPTER OUTLINE

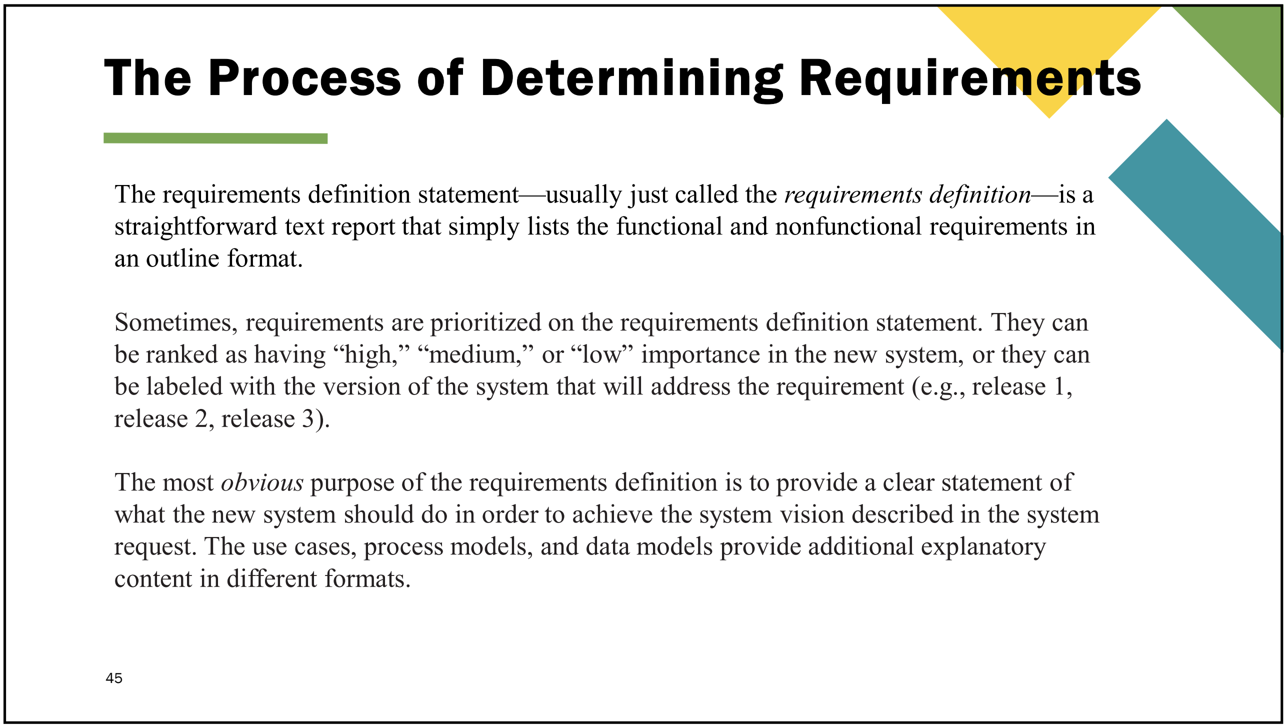
43

43



What is a Requirement?

- ✓ what the business needs → *business requirements*
- ✓ what the users need to do → *user requirements*
- ✓ what the software should do → *functional requirements*
- ✓ characteristics the system should have → *nonfunctional requirements*)
- ✓ how the system should be built → *system requirements*



The Process of Determining Requirements

The requirements definition statement—usually just called the *requirements definition*—is a straightforward text report that simply lists the functional and nonfunctional requirements in an outline format.

Sometimes, requirements are prioritized on the requirements definition statement. They can be ranked as having "high," "medium," or "low" importance in the new system, or they can be labeled with the version of the system that will address the requirement (e.g., release 1, release 2, release 3).

The most *obvious* purpose of the requirements definition is to provide a clear statement of what the new system should do in order to achieve the system vision described in the system request. The use cases, process models, and data models provide additional explanatory content in different formats.

Requirements Elicitation Techniques

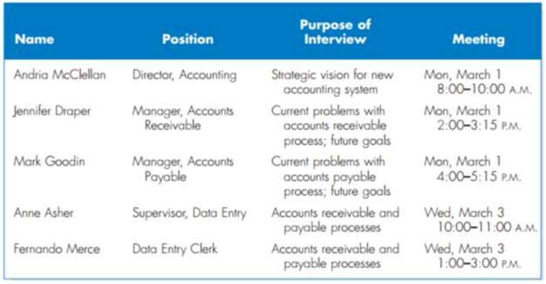
five most commonly used requirements elicitation techniques:

1. interviews,
2. JAD sessions,
3. questionnaires,
4. document analysis, and
5. observation.

1. Interviews

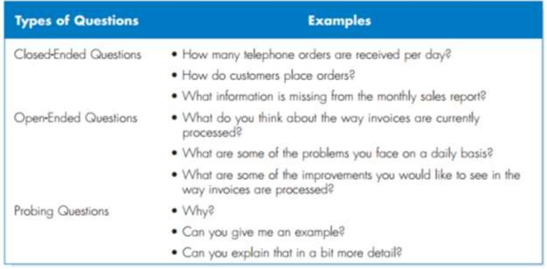
- Selecting Interviewees
  - Listing who will be interviewed
- Designing Interview Questions
  - 3types of interview questions: closed-ended questions, open-ended questions, and probing questions
- Preparing for the Interview
- Conducting the Interview
- Post-interview Follow-up
  - Prepare an interview report that describes the information from the interview

Sample Interview Schedule



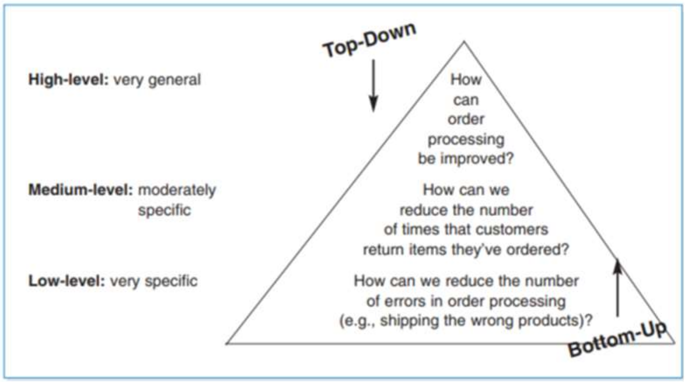
Name	Position	Purpose of Interview	Meeting
Andria McClellan	Director, Accounting	Strategic vision for new accounting system	Mon, March 1 8:00–10:00 A.M.
Jennifer Draper	Manager, Accounts Receivable	Current problems with accounts receivable process; future goals	Mon, March 1 2:00–3:15 P.M.
Mark Goodin	Manager, Accounts Payable	Current problems with accounts payable process; future goals	Mon, March 1 4:00–5:15 P.M.
Anne Asher	Supervisor, Data Entry	Accounts receivable and payable processes	Wed, March 3 10:00–11:00 A.M.
Fernando Merce	Data Entry Clerk	Accounts receivable and payable processes	Wed, March 3 1:00–3:00 P.M.

Three Types of Questions



Types of Questions	Examples
Closed-Ended Questions	• How many telephone orders are received per day? • How do customers place orders? • What information is missing from the monthly sales report?
Open-Ended Questions	• What do you think about the way invoices are currently processed? • What are some of the problems you face on a daily basis? • What are some of the improvements you would like to see in the way invoices are processed?
Probing Questions	• Why? • Can you give me an example? • Can you explain that in a bit more detail?

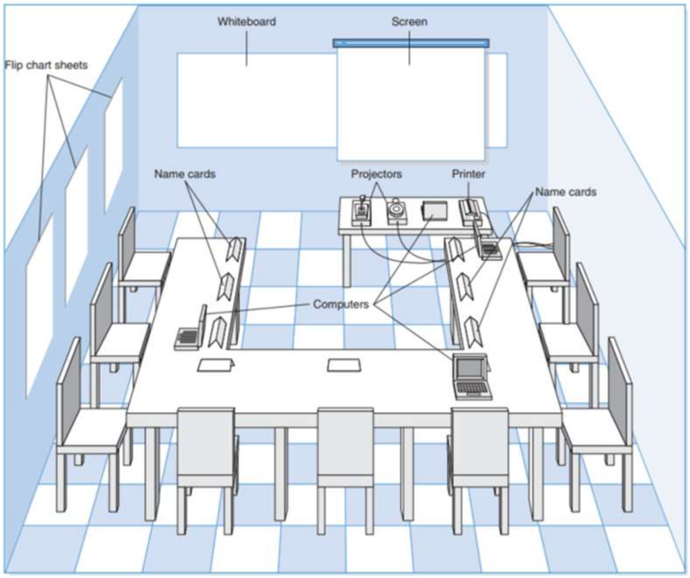
Top-Down and Bottom-Up Questioning Strategies


Top-Down
High-level: very general
How can order processing be improved?
Medium-level: moderately specific
How can we reduce the number of times that customers return items they've ordered?
Low-level: very specific
How can we reduce the number of errors in order processing (e.g., shipping the wrong products)?
Bottom-Up

2. Joint Application Development (JAD)

- Joint application development (or JAD as it is more commonly known) is an information gathering technique that allows the project team, users, and management to work together to identify requirements for the system.
- IBM developed the JAD technique in the late 1970s, and it is often the most useful method for collecting information from users
- Capers Jones claims that JAD can reduce scope creep by 50%, and it prevents the requirements for a system from being too specific or too vague
- Steps:
  - Selecting Participants
  - Designing the JAD Session
  - Preparing for the JAD Session
  - Conducting the JAD Session
  - Post-JAD Follow-up

Joint Application Development Meeting Room

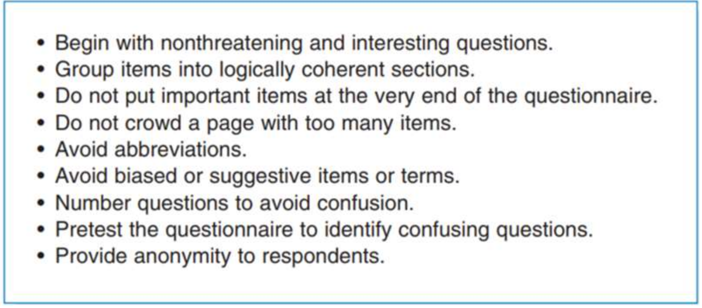


50

3. Questionnaires

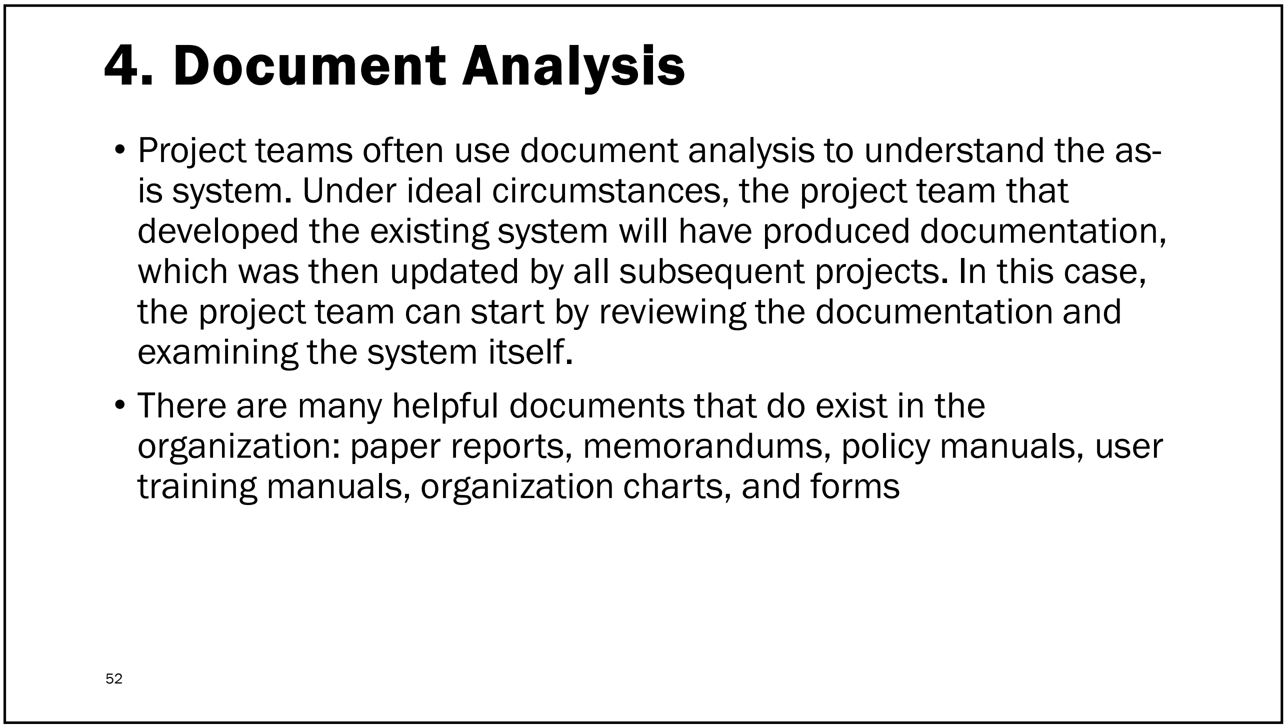
- Seleting Participants
- Designing the Questionnaire
- Administering the Questionnaire
- Questionnaire Follow-up

Good Questionnaire Design



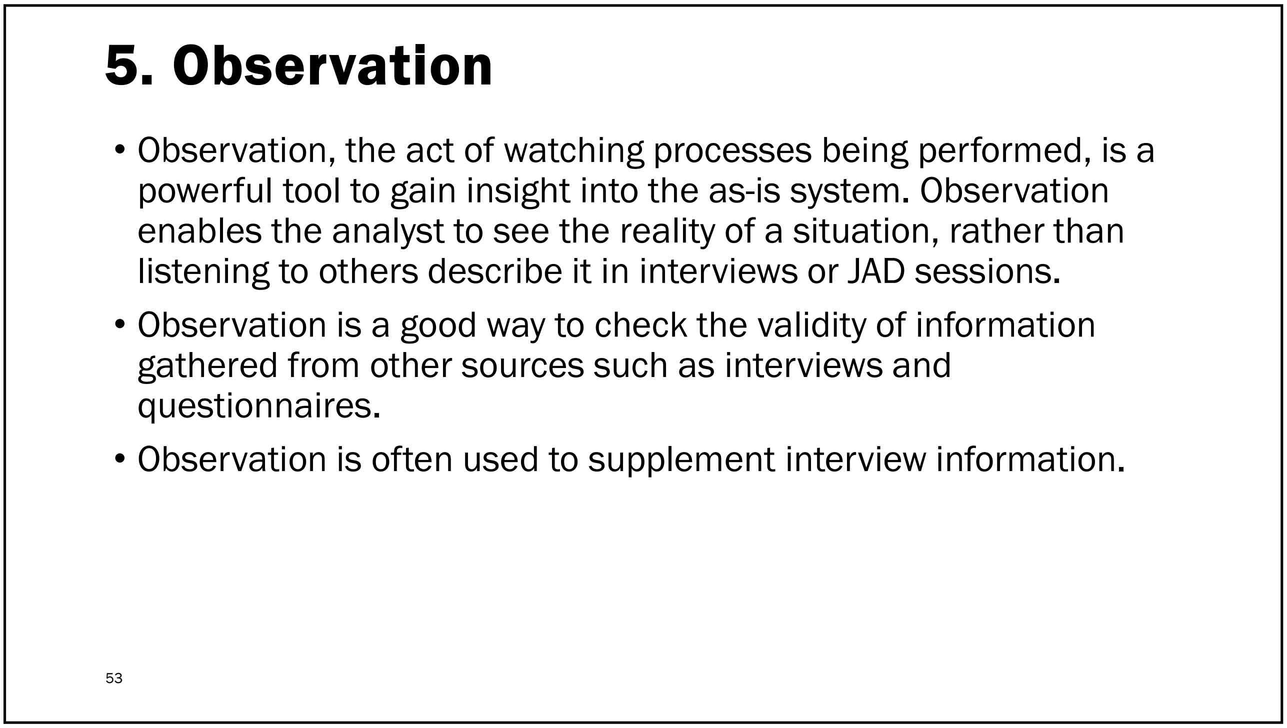
- Begin with nonthreatening and interesting questions.
- Group items into logically coherent sections.
- Do not put important items at the very end of the questionnaire.
- Do not crowd a page with too many items.
- Avoid abbreviations.
- Avoid biased or suggestive items or terms.
- Number questions to avoid confusion.
- Pretest the questionnaire to identify confusing questions.
- Provide anonymity to respondents.

51



4. Document Analysis

- Project teams often use document analysis to understand the as-is system. Under ideal circumstances, the project team that developed the existing system will have produced documentation, which was then updated by all subsequent projects. In this case, the project team can start by reviewing the documentation and examining the system itself.
- There are many helpful documents that do exist in the organization: paper reports, memorandums, policy manuals, user training manuals, organization charts, and forms

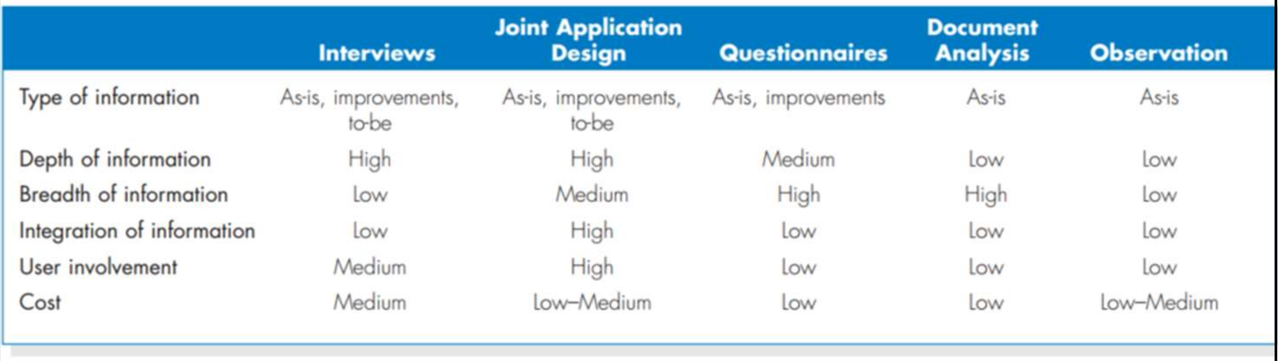


5. Observation

- Observation, the act of watching processes being performed, is a powerful tool to gain insight into the as-is system. Observation enables the analyst to see the reality of a situation, rather than listening to others describe it in interviews or JAD sessions.
- Observation is a good way to check the validity of information gathered from other sources such as interviews and questionnaires.
- Observation is often used to supplement interview information.

How to Select the Appropriate Techniques?

- Each requirement technique has strengths and weaknesses
- No one techniques is always better than the others
- In practice, most projects benefit from a combination of techniques
- Analysts' experience???
- Need to consider
  - Type of information
  - Depth of Information
  - Breadth of Information
  - Integration of Information
  - User Involvement
  - Cost



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

FIGURE 3-11
Comparison of Requirements Elicitation Techniques

Requirement Analysis Strategies

Problem Analysis

Root Cause Analysis

Duration Analysis

Activity-Based Costing

Informal Benchmarking

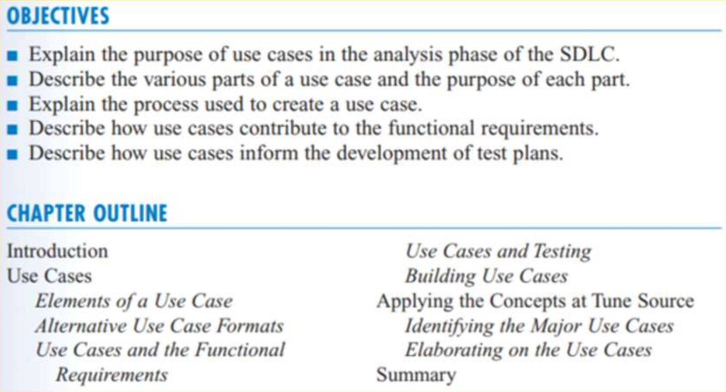
Outcome Analysis

Technology Analysis

Activity Elimination

Comparing Analysis Strategies

Chapter 4:
USE CASE ANALYSIS

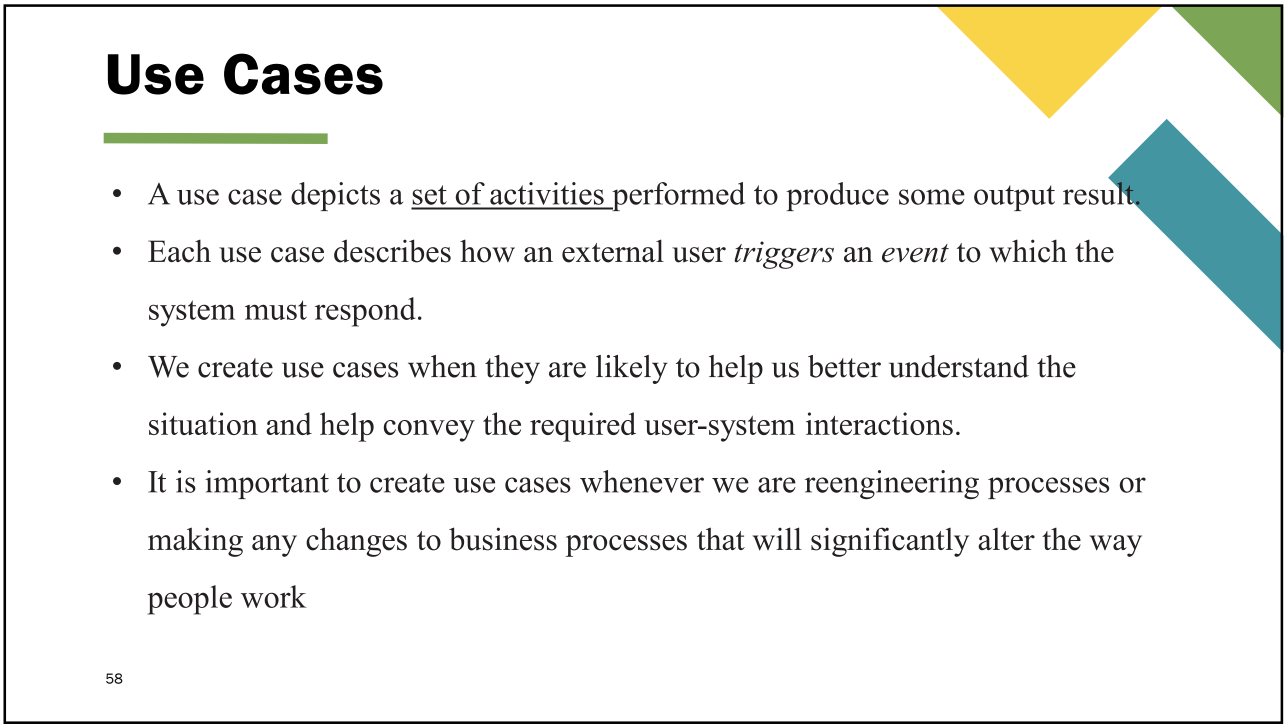


OBJECTIVES

- Explain the purpose of use cases in the analysis phase of the SDLC.
- Describe the various parts of a use case and the purpose of each part.
- Explain the process used to create a use case.
- Describe how use cases contribute to the functional requirements.
- Describe how use cases inform the development of test plans.

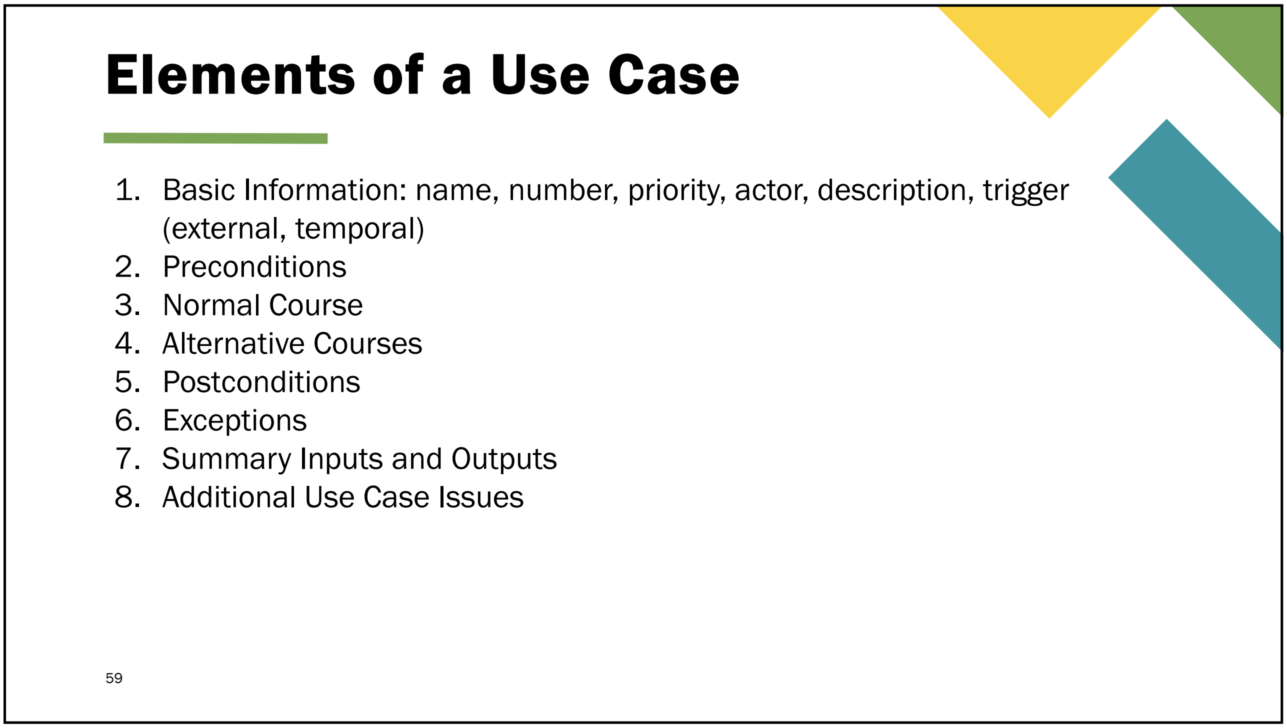
CHAPTER OUTLINE

Introduction
Use Cases
Elements of a Use Case
Alternative Use Case Formats
Use Cases and the Functional Requirements
Use Cases and Testing
Building Use Cases
Applying the Concepts at Tune Source
Identifying the Major Use Cases
Elaborating on the Use Cases
Summary



Use Cases

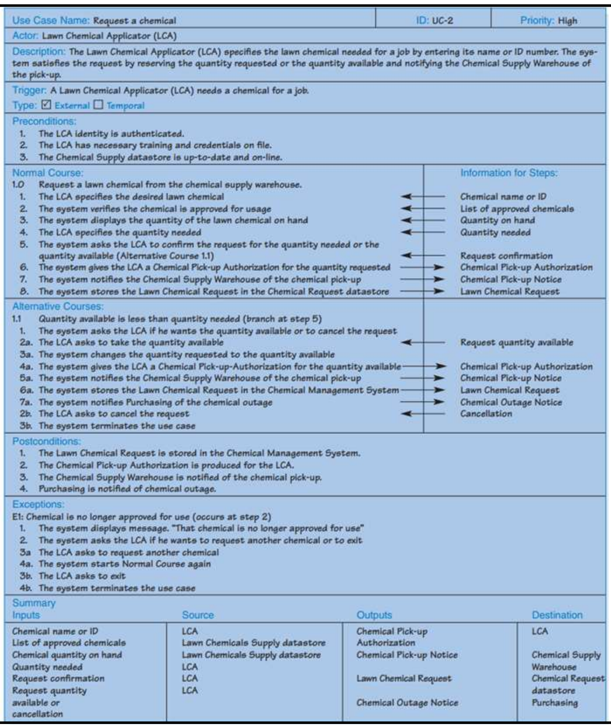
- A use case depicts a set of activities performed to produce some output result.
- Each use case describes how an external user *triggers* an *event* to which the system must respond.
- We create use cases when they are likely to help us better understand the situation and help convey the required user-system interactions.
- It is important to create use cases whenever we are reengineering processes or making any changes to business processes that will significantly alter the way people work



Elements of a Use Case

1. Basic Information: name, number, priority, actor, description, trigger (external, temporal)
2. Preconditions
3. Normal Course
4. Alternative Courses
5. Postconditions
6. Exceptions
7. Summary Inputs and Outputs
8. Additional Use Case Issues

Request a Chemical Use Case



Use Case Name: Request a chemical	ID: UC-2	Priority: High

Actor: Lawn Chemical Applicator (LCA)

Description: The Lawn Chemical Applicator (LCA) specifies the lawn chemical needed for a job by entering its name or ID number. The system satisfies the request by reserving the quantity requested or the quantity available and notifying the Chemical Supply Warehouse of the pick-up.

Trigger: A Lawn Chemical Applicator (LCA) needs a chemical for a job.

Type: ☑ External ☐ Temporal

Preconditions:
1. The LCA identity is authenticated.
2. The LCA has necessary training and credentials on file.
3. The Chemical Supply datastore is up-to-date and on-line.

Normal Course:		Information for Steps:
1.0 Request a lawn chemical from the chemical supply warehouse.		
1. The LCA specifies the desired lawn chemical	←	Chemical name or ID
2. The system verifies the chemical is approved for usage	←	List of approved chemicals
3. The system displays the quantity of the lawn chemical on hand	←	Quantity on hand
4. The LCA specifies the quantity needed	←	Quantity needed
5. The system asks the LCA to confirm the request for the quantity needed or the quantity available (Alternative Course 1.1)	←	Request confirmation
6. The system gives the LCA a Chemical Pick-up Authorization for the quantity requested	→	Chemical Pick-up Authorization
7. The system notifies the Chemical Supply Warehouse of the chemical pick-up	→	Chemical Pick-up Notice
8. The system stores the Lawn Chemical Request in the Chemical Request datastore	→	Lawn Chemical Request
Alternative Courses:		
1.1 Quantity available is less than quantity needed (branch at step 5)		
1. The system asks the LCA if he wants the quantity available or to cancel the request		
2a. The LCA asks to take the quantity available	←	Request quantity available
3a. The system changes the quantity requested to the quantity available		
4a. The system gives the LCA a Chemical Pick-up-Authorization for the quantity available	→	Chemical Pick-up Authorization
5a. The system notifies the Chemical Supply Warehouse of the chemical pick-up	→	Chemical Pick-up Notice
6a. The system stores the Lawn Chemical Request in the Chemical Management System	→	Lawn Chemical Request
7a. The system notifies Purchasing of the chemical outage	→	Chemical Outage Notice
2b. The LCA asks to cancel the request	←	Cancellation
3b. The system terminates the use case		

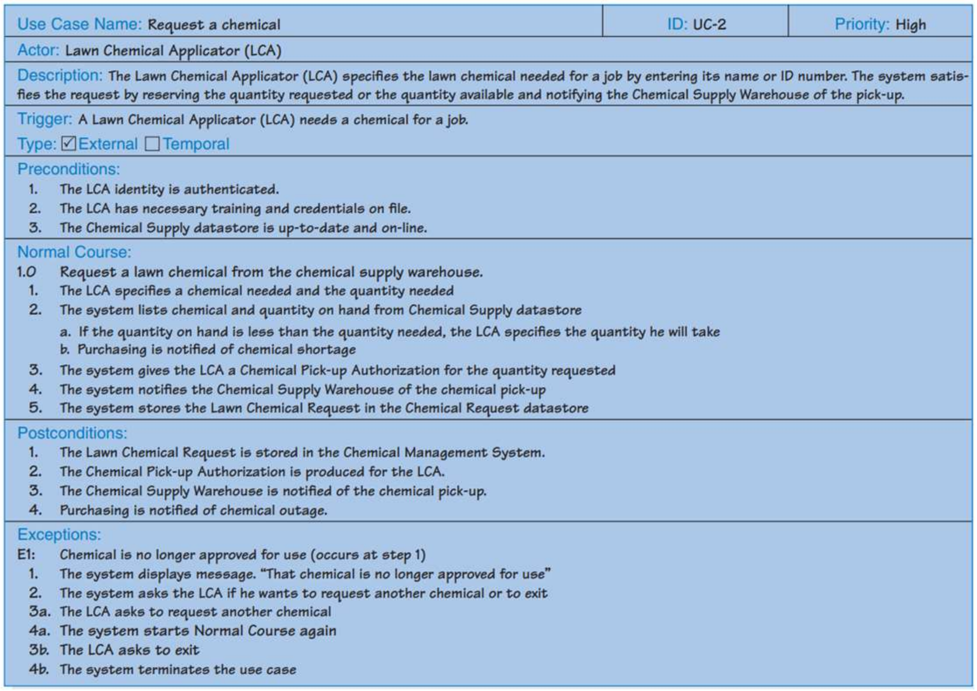
Postconditions:
1. The Lawn Chemical Request is stored in the Chemical Management System.
2. The Chemical Pick-up Authorization is produced for the LCA.
3. The Chemical Supply Warehouse is notified of the chemical pick-up.
4. Purchasing is notified of chemical outage.

Exceptions:
E1: Chemical is no longer approved for use (occurs at step 2)
1. The system displays message. "That chemical is no longer approved for use"
2. The system asks the LCA if he wants to request another chemical or to exit
3a The LCA asks to request another chemical
4a. The system starts Normal Course again
3b. The LCA asks to exit
4b. The system terminates the use case

Summary

Inputs	Source	Outputs	Destination
Chemical name or ID	LCA	Chemical Pick-up Authorization	LCA
List of approved chemicals	Lawn Chemicals Supply datastore		
Chemical quantity on hand	Lawn Chemicals Supply datastore	Chemical Pick-up Notice	Chemical Supply Warehouse
Quantity needed	LCA		
Request confirmation	LCA	Lawn Chemical Request	Chemical Request datastore
Request quantity available or cancellation	LCA	Chemical Outage Notice	Purchasing

Request a Chemical Use Case—Casual Format



Use Case Name: Request a chemical	ID: UC-2	Priority: High

Actor: Lawn Chemical Applicator (LCA)

Description: The Lawn Chemical Applicator (LCA) specifies the lawn chemical needed for a job by entering its name or ID number. The system satisfies the request by reserving the quantity requested or the quantity available and notifying the Chemical Supply Warehouse of the pick-up.

Trigger: A Lawn Chemical Applicator (LCA) needs a chemical for a job.

Type: ☑External ☐Temporal

Preconditions:
1. The LCA identity is authenticated.
2. The LCA has necessary training and credentials on file.
3. The Chemical Supply datastore is up-to-date and on-line.

Normal Course:

1.0 Request a lawn chemical from the chemical supply warehouse.
1. The LCA specifies a chemical needed and the quantity needed
2. The system lists chemical and quantity on hand from Chemical Supply datastore
   a. If the quantity on hand is less than the quantity needed, the LCA specifies the quantity he will take
   b. Purchasing is notified of chemical shortage
3. The system gives the LCA a Chemical Pick-up Authorization for the quantity requested
4. The system notifies the Chemical Supply Warehouse of the chemical pick-up
5. The system stores the Lawn Chemical Request in the Chemical Request datastore

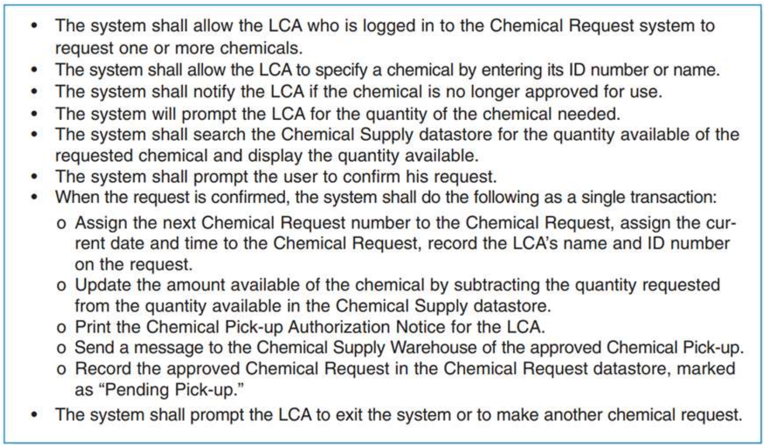
Postconditions:
1. The Lawn Chemical Request is stored in the Chemical Management System.
2. The Chemical Pick-up Authorization is produced for the LCA.
3. The Chemical Supply Warehouse is notified of the chemical pick-up.
4. Purchasing is notified of chemical outage.

Exceptions:

E1: Chemical is no longer approved for use (occurs at step 1)
1. The system displays message. "That chemical is no longer approved for use"
2. The system asks the LCA if he wants to request another chemical or to exit
3a. The LCA asks to request another chemical
4a. The system starts Normal Course again
3b. The LCA asks to exit
4b. The system terminates the use case

Use Cases and the Functional Requirements

Transforming the user's view into the developer's view by creating functional requirements is one of the important contributions that the systems analyst makes to the development project.



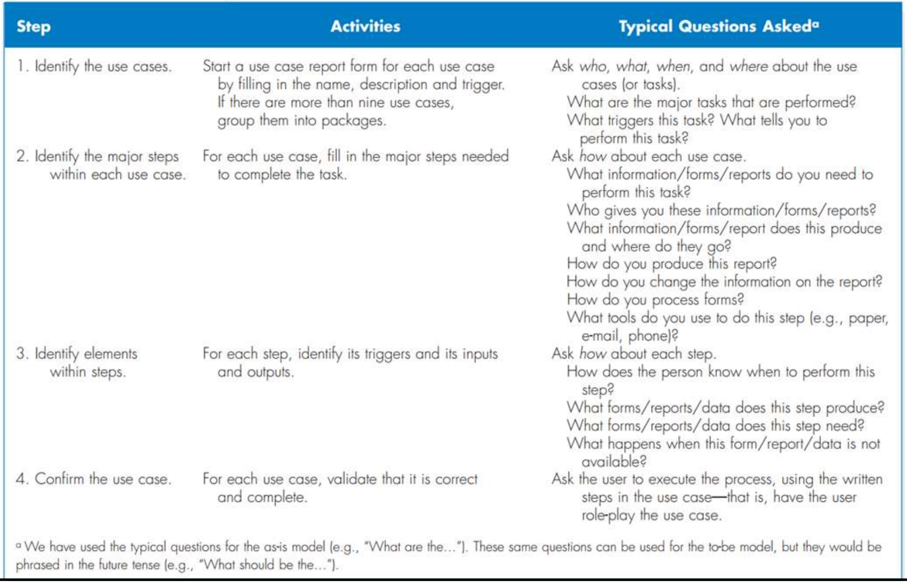
- The system shall allow the LCA who is logged in to the Chemical Request system to request one or more chemicals.
- The system shall allow the LCA to specify a chemical by entering its ID number or name.
- The system shall notify the LCA if the chemical is no longer approved for use.
- The system will prompt the LCA for the quantity of the chemical needed.
- The system shall search the Chemical Supply datastore for the quantity available of the requested chemical and display the quantity available.
- The system shall prompt the user to confirm his request.
- When the request is confirmed, the system shall do the following as a single transaction:
  - o Assign the next Chemical Request number to the Chemical Request, assign the current date and time to the Chemical Request, record the LCA's name and ID number on the request.
  - o Update the amount available of the chemical by subtracting the quantity requested from the quantity available in the Chemical Supply datastore.
  - o Print the Chemical Pick-up Authorization Notice for the LCA.
  - o Send a message to the Chemical Supply Warehouse of the approved Chemical Pick-up.
  - o Record the approved Chemical Request in the Chemical Request datastore, marked as "Pending Pick-up."
- The system shall prompt the LCA to exit the system or to make another chemical request.

Chemical Request (Normal Course) Functional Requirements

Use Cases and Testing

- Many organizations develop test plans early in the development process.
- By studying the use cases and the functional requirements derived from them, the testing personnel can readily identify elements of the tests they will want to perform when the system enters testing.

Building Use Cases



Step	Activities	Typical Questions Asked[a]
1. Identify the use cases.	Start a use case report form for each use case by filling in the name, description and trigger. If there are more than nine use cases, group them into packages.	Ask *who*, *what*, *when*, and *where* about the use cases (or tasks). What are the major tasks that are performed? What triggers this task? What tells you to perform this task?
2. Identify the major steps within each use case.	For each use case, fill in the major steps needed to complete the task.	Ask *how* about each use case. What information/forms/reports do you need to perform this task? Who gives you these information/forms/reports? What information/forms/report does this produce and where do they go? How do you produce this report? How do you change the information on the report? How do you process forms? What tools do you use to do this step (e.g., paper, e-mail, phone)?
3. Identify elements within steps.	For each step, identify its triggers and its inputs and outputs.	Ask *how* about each step. How does the person know when to perform this step? What forms/reports/data does this step produce? What forms/reports/data does this step need? What happens when this form/report/data is not available?
4. Confirm the use case.	For each use case, validate that it is correct and complete.	Ask the user to execute the process, using the written steps in the use case—that is, have the user role-play the use case.

[a] We have used the typical questions for the as-is model (e.g., "What are the…"). These same questions can be used for the to-be model, but they would be phrased in the future tense (e.g., "What should be the…").