

# Chapter 3: Requirements Determination



# Learning Objectives

- Learn how to create a requirements definition
- Learn various requirements analysis techniques
- Learn when to use each requirements analysis techniques
- Learn how to gather requirements using interviews, JAD sessions, questionnaires, document analysis & observation
- Learn various requirements documentation techniques such as concept maps, story cards & task-lists
- Understand when to use each requirements-gathering technique
- Be able to begin the creation of a system proposal



# Introduction

- The systems development process transforms the existing (as is) system into the proposed (to be) system
- Requirements determination
  - The single most critical step of the entire SDLC
  - Changes can be made easily in this stage
  - Most (>50%) system failures are due to problems with requirements
  - The iterative process of OOSAD is effective because:
    - Small batches of requirements can be identified and implemented incrementally
    - The system will evolve over time



# Requirements Determination

- Purpose: to convert high level business requirements (from the system request) into detailed requirements that can be used as inputs for creating models
- What is a requirement?
  - A statement of what the system must do or a characteristic it must have
  - Will later evolve into a technical description of how the system will be implemented
- Types:
  - Functional: relates to a process or data
  - Non-functional: relates to performance or usability



# Nonfunctional Requirements

Requirement type	Example
Operational	<ul style="list-style-type: none"><li>• The system should be able to fit in a pocket or purse</li><li>• The system should be able to integrate with the existing inventory system.</li></ul>
Performance	<ul style="list-style-type: none"><li>• Any interaction between the user and the system should not exceed 2 seconds.</li><li>• The system should receive updated inventory information every 15 minutes.</li></ul>
Security	<ul style="list-style-type: none"><li>• Only direct managers can see personnel records of staff</li><li>• Customers can see their order history only during business hours.</li></ul>
Cultural & Political	<ul style="list-style-type: none"><li>• The system should be able to distinguish between United States and European currency</li><li>• The system shall comply with insurance industry standards.</li></ul>



# Requirements Definition

- Functional & non-functional requirements listed in outline format
- May be prioritized
- Provides information needed in subsequent workflows
- Defines the scope of the system



# Determining Requirements

- Business & IT personnel need to collaborate
- Strategies for effective results:
  - Business Process Analysis (BPA)
  - Business Process Improvement (BPI)
  - Business Process Reengineering (BPR)



# Determining Requirements

- Requirements are best determined by systems analysts **and** business people together
- Strategies for analyzing the requirements
  - Business Process Analysis (BPA)
  - Business Process Improvement (BPI)
  - Business Process Reengineering (BPR)
- Techniques for identifying requirements
  - Interviews, questionnaires and/or observation
  - Joint application development (JAD)
  - Document analysis





# Creating a Requirements Definition

- Determine the types of functional and non-functional requirements applicable to the project
- Use requirements-gathering techniques to collect details
- Analysts work with users to verify, change and prioritize each requirement
- Continue this process through analysis workflow, but be careful of scope creep
- Requirements that meet a need but are not within the current scope can be added to a list of future enhancements



# Problems in Requirements Determination

- Analyst may not have access to the correct users
- Requirements specifications may be inadequate
- Some requirements may not be known in the beginning
- Verifying and validating requirements can be difficult



# Requirements Analysis Strategies

- Business Process Automation (BPA)
  - Least amount of change to the current system
  - Use computer technology to automate some portions
- Business Process Improvement (BPI)
  - Moderate amount of change is required
  - Designed to improve efficiency of the current system
- Business Process Reengineering (BPR)
  - Most amount of change—a complete makeover
  - Focus is on the to-be system—little time spent on the current system



# Business Process Automation

- Techniques
  - Problem analysis
    - Ask users to identify problems with the current system
    - Ask users how they would solve these problems
    - Good for improving efficiency or ease-of-use
  - Root cause analysis
    - Focus is on the cause of a problem, not its solution
    - Create a prioritized list of problems
    - Try to determine their causes
    - Once the causes are known, solutions can be developed



# Business Process Improvement

- Techniques:
  - Duration analysis
    - Determine the time required to complete each step in a business process
    - Compare this to the total time required for the entire process
    - Large differences suggest problems that might be solved by:
      - Integrating some steps together
      - Performing some steps simultaneously (in parallel)
  - Activity-based costing—same as duration analysis but applied to costs
  - Informal benchmarking—analyzes similar processes in other successful organizations



# Business Process Reengineering

- Institutes maximum change: “Out with the old and in with the new”
- Techniques:
  - Outcome analysis—what does the customer want in the end?
  - Technology analysis—apply new technologies to business processes & identify benefits
  - Activity elimination—eliminate each activity in a business process in a “force-fit” exercise



# Selecting An Appropriate Strategy

	<b>Business Process Automation</b>	<b>Business Process Improvement</b>	<b>Business Process Reengineering</b>
<b>Potential business value</b>	Low–moderate	Moderate	High
<b>Project cost</b>	Low	Low–moderate	High
<b>Breadth of analysis</b>	Narrow	Narrow–moderate	Very broad
<b>Risk</b>	Low–moderate	Low–moderate	Very high



# Requirements Gathering Techniques

- Process is used to:
  - Uncover all requirements (those uncovered late in the process are more difficult to incorporate)
  - Build support and trust among users
- Which technique(s) to use?
  - Interviews
  - Joint Application Development (JAD)
  - Questionnaires
  - Document analysis
  - Observation





# Interviews

- Most popular technique—if you need to know something, just ask
- Process:
  - Select people to interview & create a schedule
  - Design interview questions (Open-ended, closed-ended, & probing types of questions)
  - Prepare for the interview (Unstructured vs. structured interview organized in a logical order)
  - Conduct the interview (Top-down vs. bottom-up)
  - Follow-up after the interview

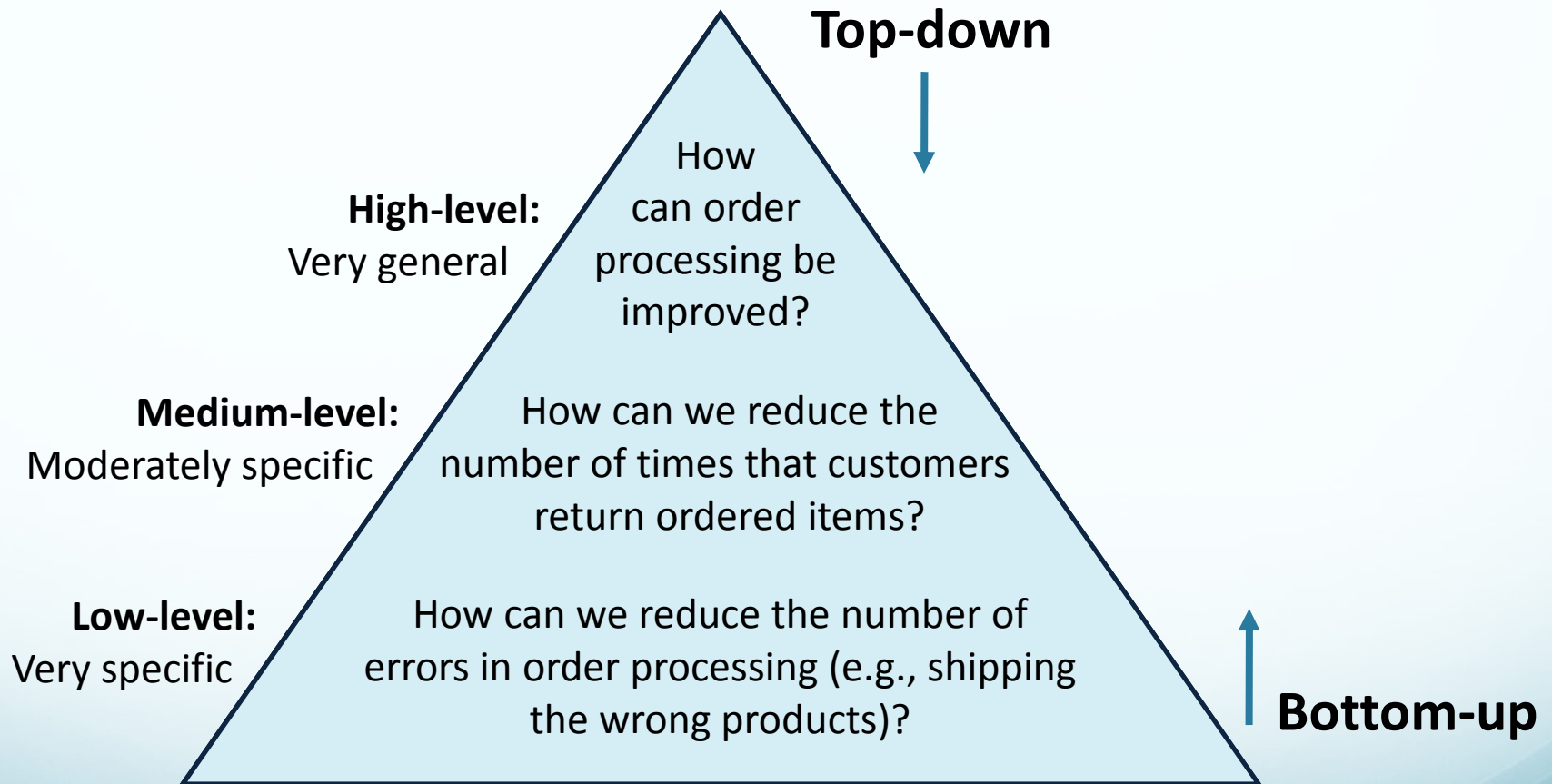


# Question Types

Types of Questions	Examples
Closed-ended questions	<ul style="list-style-type: none"><li>• How many telephone orders are received per day?</li><li>• How do customers place orders?</li><li>• What information is missing from the monthly sales report?</li></ul>
Open-ended questions	<ul style="list-style-type: none"><li>• What do you think about the current system?</li><li>• What are some of the problems you face on a daily basis?</li><li>• What are some of the improvements you would like to see in a new system?</li></ul>
Probing questions	<ul style="list-style-type: none"><li>• Why?</li><li>• Can you give me an example?</li><li>• Can you explain that in a bit more detail?</li></ul>



# Interviewing Strategies



# Post-Interview

- Prepare notes and send to the interviewee for verification

Interview Notes Approved by: Linda Estey
<p><b>Person Interviewed:</b> Linda Estey, Director, Human Resources</p> <p><b>Interviewer:</b> Barbara Wixom</p> <p><b>Purpose of Interview:</b></p> <ul style="list-style-type: none"><li>• Understand reports produced for Human Resources by the current system</li><li>• Determine information requirements for future system</li></ul> <p><b>Summary of Interview:</b></p> <ul style="list-style-type: none"><li>• Sample reports of all current HR reports are attached to this report. The information that is not used and missing information are noted on the reports.</li><li>• Two biggest problems with the current system are:<ol style="list-style-type: none"><li>1. The data are too old (the HR Department needs information within two days of month end; currently information is provided to them after a three-week delay)</li><li>2. The data are of poor quality (often reports must be reconciled with departmental HR database)</li></ol></li><li>• The most common data errors found in the current system include incorrect job level information and missing salary information.</li></ul> <p><b>Open Items:</b></p> <ul style="list-style-type: none"><li>• Get current employee roster report from Mary Skudrna (extension 4355).</li><li>• Verify calculations used to determine vacation time with Mary Skudrna.</li><li>• Schedule interview with Jim Wack (extension 2337) regarding the reasons for data quality problems.</li></ul> <p><b>Detailed Notes:</b> See attached transcript.</p>



# Joint Application Development (JAD)

- Joint user-analyst meeting hosted by a facilitator
  - 10 to 20 users
  - 1 to 2 scribes as needed to record the session
  - Usually in a specially prepared room
- Meetings can be held electronically and anonymously
  - Reduces problems in group settings
  - Can be held remotely
- Sessions require careful planning to be successful
  - Users may need to bring documents or user manuals
  - Ground rules should be established



# Questionnaires

- A set of written questions used to obtain information from individuals
- May be paper based or electronic (e.g., web based)
- Common uses:
  - Large numbers of people
  - Need both information and opinions
  - When designing for use outside the organization (customers, vendors, etc.)
- Typical response rates: < 50% (paper); < 30% (Web)



# Questionnaire Steps

- Select the participants
  - Identify the population
  - Use representative samples for large populations
- Designing the questionnaire
  - Careful question selection
  - Remove ambiguities
- Administering the questionnaire
  - Working to get good response rate
  - Offer an incentive (e.g., a free pen)
- Questionnaire follow-up
  - Send results to participants
  - Send a thank-you



# Good Questionnaire Design

- Begin with non-threatening and interesting questions
- Group items into logically coherent sections
- No important items at the very end
- Do not crowd a page with too many items
- Avoid abbreviations
- Avoid biased or suggestive items or terms
- Number questions to avoid confusion
- Pretest to identify confusing questions
- Provide anonymity to respondents





# Document Analysis

- Provides information about the “as-is” system
- Review technical documents when available
- Review typical user documents:
  - Forms
  - Reports
  - Policy manuals
- Look for user additions to forms
- Look for unused form elements



# Observation

- Users/managers often don't remember everything they do
- Checks validity of information gathered in other ways
- Behaviors may change when people are watched
  - Workers tend to be very careful when watched
  - Keep a low profile
  - Try not to interrupt or influence workers
- Be careful not to ignore periodic activities
  - Weekly ... Monthly ... Annually



# Requirements-Gathering Techniques Compared

- A combination of techniques may be used
- Document analysis & observation require little training; JAD sessions can be very challenging

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



# Alternative Techniques

- Concept Maps
  - Represent meaningful relationships between concepts
  - Focus individuals on a small number of key ideas
- Story Cards & Task Lists
  - Associated with agile development methods
  - File cards with a single requirement
  - Each requirement is discussed
    - How much effort is required to implement it
    - A task list is created for each requirement (story)
    - Large requirements can be split into smaller sections



# The System Proposal

- Combines all material created in planning & analysis
- Included sections:
  - Executive summary
    - Provides all critical information in summary form
    - Helps busy executives determine which sections they need to read in more detail
  - The system request
  - The workplan
  - The feasibility analysis
  - The requirements definition
  - Current models of the system (expected to evolve)



# System Proposal Template

## 1. Table of Contents

## 2. Executive Summary

A summary of all the essential information in the proposal so a busy executive can read it quickly and decide what parts of the proposal to read in more depth.

## 3. System Request

The revised system request form (see Chapter 2).

## 4. Workplan

The original workplan, revised after having completed analysis (see Chapter 2).

## 5. Feasibility Analysis

A revised feasibility analysis, using the information from analysis (see Chapter 2).

## 6. Requirements Definition

A list of the functional and nonfunctional business requirements for the system (this chapter).

## 7. Functional Model

An activity diagram, a set of use case descriptions, and a use case diagram that illustrate the basic processes or external functionality that the system needs to support (see Chapter 4).

## 8. Structural Models

A set of CRC cards, class diagram and object diagrams that describe the structural aspects of the to-be system (see Chapter 5). This may also include structural models of the current as-is system that will be replaced.

## 9. Behavioral Models

A set of sequence diagrams, communication diagrams, behavioral state machines, and a CRUD matrix that describe the internal behavior of the to-be system (see Chapter 6). This may include behavioral models of the as-is system that will be replaced.

## Appendices

These contain additional material relevant to the proposal, often used to support the recommended system. This might include results of a questionnaire survey or interviews, industry reports and statistics, and so on.



# Summary

- Presented in this chapter:
  - Discussion of functional and non-functional requirements determination
  - Requirements analysis strategies
  - Requirements gathering techniques
  - Alternative requirements documentation techniques
  - The system proposal

