UNIVERSITAS INDONESIA

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FAKULTAS ILMU KOMPUTER

TOPIC 3

REQUIREMENT ANALYSIS

ANALISIS DAN PERANCANGAN SISTEM INFORMASI

CSIM603183

Learning Objectives

1. Able to **create and define a requirement** in IS project
2. Able to **explain the various technique for requirement analysis** in IS project
3. Able to **apply the various technique for requirement analysis** in IS project
4. Able to **explain the utilization of requirement analysis technique** in IS project
5. Able to **explain how to do requirements-gathering** by using interview, JAD, questionnaires, document analysis, and observation in an IS project
6. Able to **explain the utilization of each requirements-gathering technique**

Session Outline

1. Requirement Determination
2. Requirement Analysis Strategies
3. Requirement Gathering Techniques
4. The System Proposal

1.1 REQUIREMENT DETERMINATION

Key Ideas

- The ***As-Is system*** is the current system and may or may not be computerized
  - Get as clear as possible the existing system
- The ***To-Be system*** is the new system that is based on updated requirements
  - Show that to-be system is much better than as-is system
- The ***System Proposal*** is the key deliverable from the Analysis Phase
  - It's a proposed logical information systems: functional and non-functional requirements

Key Ideas

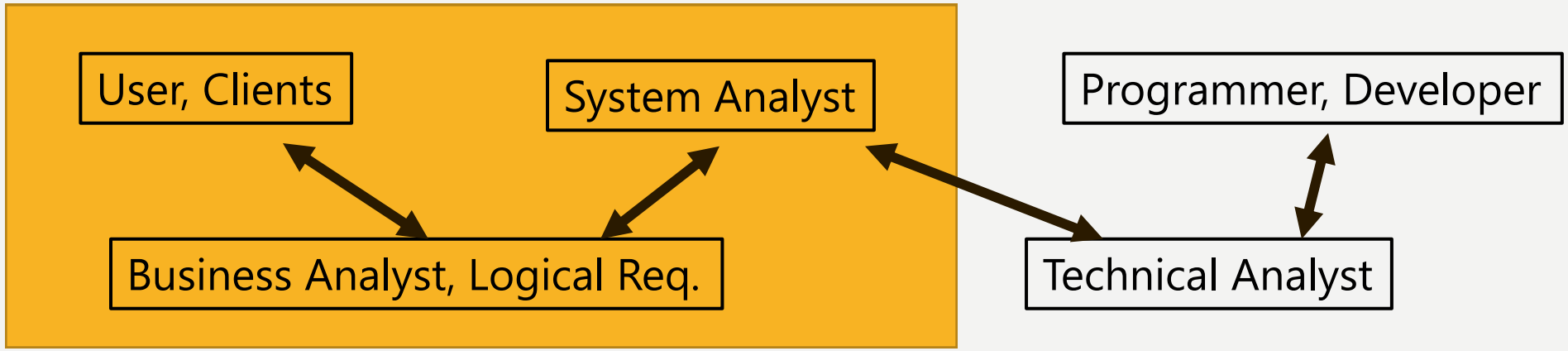
- The **goal** of the analysis phase is to truly understand the **requirements** of the new system and develop a system that addresses them – or decide a new system isn't needed
- The **System Proposal** is presented to the approval committee
- The first challenge is finding the **right people** to participate.
- The second challenge is **collecting and integrating the information.**
- **Requirement determination** is the **critical step** in the SDLC
  - The purpose of requirement determination is to **turn the very high level explanation** of the business requirements stated in the system request into a more **precise list of requirement** that can be used as inputs to the rest of analysis (creating **functional. structural, and behavioral model**).

A Requirement

- A statement of **what the system must do**
- A statement of **characteristics the system must have**
- Focus is on business user needs during analysis phase → **business requirement**
- Requirements will change over time as project moves from analysis to design to implementation
  - So, be aware of project scope creep due to the requirements change.

What is the differences between requirement in analysis phase and design phase?

User (business person) perspectives VS Developer perspectives



Requirement Types

1. **Functional** Requirements: relates to a process or data
   - A process the system **has to perform**
   - Information the system must contain
   - Focus on functionality of features
2. **Nonfunctional** Requirements: relates to performance or usability
   - **Behavioral properties** the system must consider
     - Operational
     - Performance
     - Security
     - Cultural and political aspects
   - Nonfunctional requirements can **influence functional, structural, and behavioral model**

Example of Functional and Non-Functional Requirements

Functional Requirements	Non-functional Requirements
• **Products** The system **shall display** a list of all products offered by the shop. *MustHave* The system **shall organise** the list of products by product category. *MustHave* The system **shall display** detailed product descriptions consisting of name, photograph, price and text of description on demand. *MustHave* The system shall allow the items in the catalogue to be **searched**. *ShouldHave*. The system **shall display** the number of items currently in the shopping basket on each page of the catalogue. *CouldHave* • **Payment** The system **shall accept** all major credit cards. *MustHave* The system **shall validate** payment with the credit card processing company. *MustHave*	• **Capacity** The system shall support 1000 transactions per day. *ShouldHave* The system shall support a peak transaction rate of 10 transactions per second. *ShouldHave* The system shall support 5000 concurrent sessions. *MustHave* • **Availability** The system shall be available 24 hours per day, 360 days per year. *MustHave* The system shall not lose any transaction data. *MustHave* The system shall accept payment and raise an order within 5 seconds in 95% of the cases. *ShouldHave* The system shall log in a customer within 5 seconds. *ShouldHave*

Non-Functional Requirements

Requirement type	Example
Operational	• The system should be able to fit in a pocket or purse • The system should be able to integrate with the existing inventory system.
Performance	• Any interaction between the user and the system should not exceed 2 seconds. • The system should receive updated inventory information every 15 minutes.
Security	• Only direct managers can see personnel records of staff • Customers can see their order history only during business hours.
Cultural & Political	• The system should be able to distinguish between United States and European currency • The system shall comply with insurance industry standards.

Documenting Requirements

- Requirements definition report
  - Text document listing requirements in outline form
  - **Priorities** may be included
- Key purpose is to define the **project scope:** what is and is not to be included.
- Your accountability and responsibility to the IS Project is proven by this documentation.

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Purposes of a requirements specification documents

A requirements specification document is used by many different stakeholder for different purposes:

1. **Customer** - part of a formal contract
2. **Manager** - basis for the project plan
3. **Developer** - basis for the design and implementation
4. **Tester** - document to test the system against
5. **Maintainer** - starting point for understanding the system

Determining Requirements

- Participation by business users/experts and IT analyst is essential
  - If done only by **IT analyst**, may not address true business needs
  - If done only by **business experts**, may not take advantage of technology → **simply automate an existing systems**
- Three techniques help users discover their needs for the new system:
  1. Business Process Automation (BPA)
  2. Business Process Improvement (BPI)
  3. Business Process Reengineering (BPR)

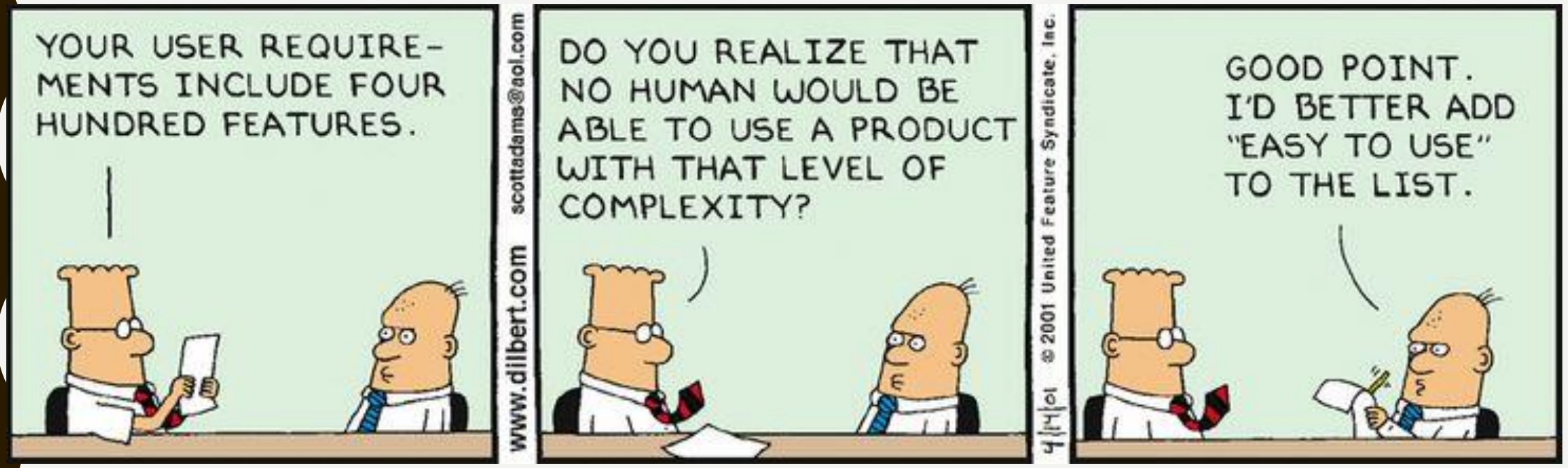
Basic Process of Analysis (Determining Requirements)

1. Understand the "**As-Is**" system
2. Identify **improvement opportunities**
3. Develop the "**To-Be**" system concept

- Techniques vary in amount of change
  - BPA (Business Process Automation) – small change
  - BPI (Business Process Improvement) – moderate change
  - BPR ((Business Process Reengineering) – significant change
- Additional information gathering techniques are needed as well

Requirement Definition

- Creating a requirements definition is an **iterative and ongoing process.**
- However, the evolution of the requirements definition must be carefully managed → **scope creep**
- **Real-world problem** with requirement determination:
  1) **Access** to the correct set of users to uncover the complete set of requirements
  2) **Specification** of the requirements may be inadequate
  3) Some requirements are simply **unknowable** at the beginning of a development process
  4) **Verifying and validating** of requirements can be very difficult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HUNDRED FEATURES.
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GOOD POINT.
I'D BETTER ADD
"EASY TO USE"
TO THE LIST.


TODAY IS THE THREE-YEAR ANNIVERSARY OF OUR FIRST MEETING TO DISCUSS PROJECT REQUIREMENTS.
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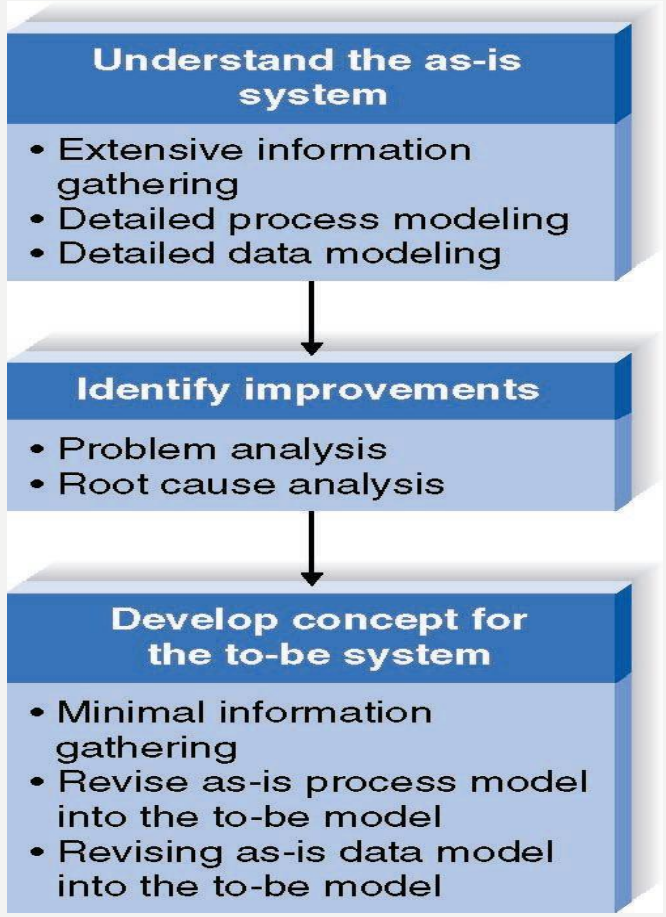
WHEN YOU'RE DONE, CAN WE TALK ABOUT REQUIREMENTS?

1.2 REQUIREMENT ANALYSIS TECHNIQUES

Discovering Needs of New Systems

1. Business Process Automation
2. Business Process Improvement
3. Business Process Reengineering

Business Process Automation



Characteristics:

- Doesn't change basic operations
- Automates some operations

Goal: Efficiency for users

What are the negative and positive impacts of BPA?

Business Process Automation

Pros:

- Quick wins (unless processes are extremely complex)
- Less culture shock
- Reduce human error
- Start collecting process metrics baselines to analyze future process improvements
- Reduce paper, fax, emails, etc.

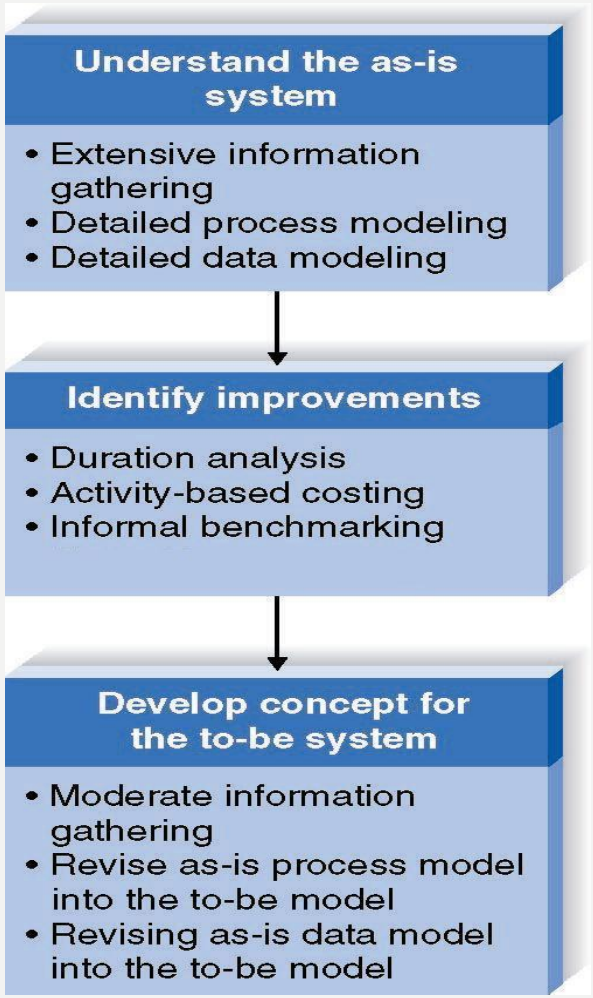
Cons:

- Only small efficiency gains are realized
- Automating non-value add processes
- Missed opportunity to optimize work flow
- May never get A chance to improve processes

Business Process Improvement

- Changes how an organization operates
- Changes operation with new techniques (i.e., take advantage of new opportunities offered by technology)
- Can improve efficiency (i.e., doing things right)
- Can improve effectiveness (i.e., doing the right things)
- More focus on to-be system for improvement (i.e., less on as-is system than BPA)

Business Process Improvement



Goal: Efficiency and effectiveness for users

What are the negative and positive impacts of BPI?

Business Process Improvement

- **Pros**
  - Reduce or eliminate waste
  - Potential huge return on investment
  - Improve employee performance and customer experience
  - Reduce complexity of systems
  - Financial justification of process steps
- **Cons**
  - Potential culture shock issues
  - Requires more executive support
  - More expensive to implement
  - Requires more attention to change management

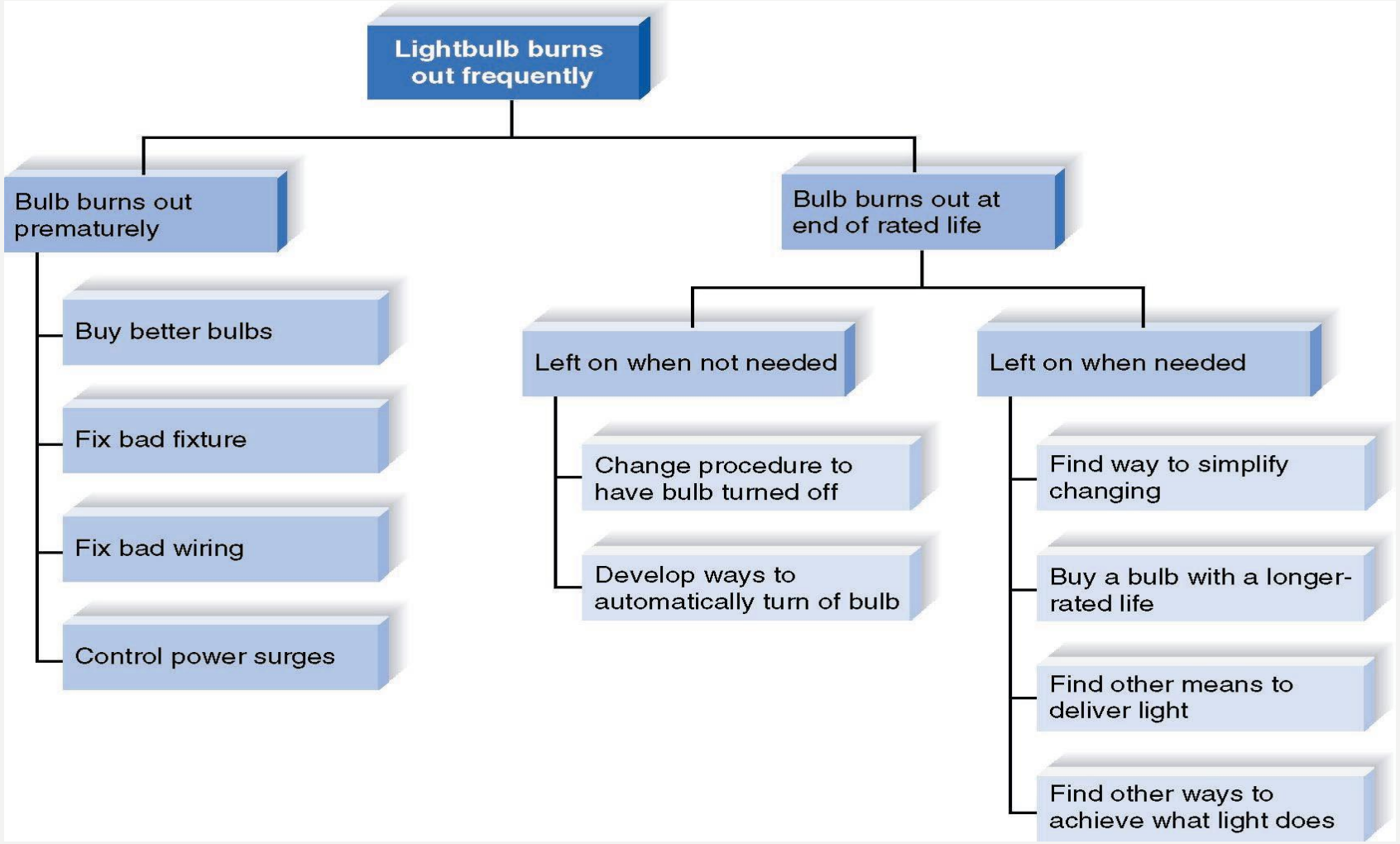
Requirement Analysis Strategy in Identifying Improvement

1. Problem Analysis
2. Root-Cause Analysis
3. Duration Analysis
4. Activity Based Costing
5. Informal Benchmarking
6. Outcome Analysis
7. Technology Analysis
8. Activity Elimination

Problem Analysis & Root Cause Analysis

- **Problem Analysis**
  - Identify problems with as-is system and to describe how to solve them in the to-be system → **Ask users to identify problems and solutions**
  - Improvements tend to be **small and incremental**
  - Rarely finds improvements with significant business value
- **Root Cause Analysis**
  - Challenge assumptions about why problem exists
  - Trace symptoms to their causes to discover the "real" problem
  - Identify the **root causes** of problems rather than symptoms of problems

Root Cause Analysis Example



Duration Analysis

- Calculate time needed for **each process step**
- Calculate time needed for **overall process**
- Compare the two – **a large difference indicates a badly fragmented process**
- Potential solutions:
  - **Process integration** – change the process to use fewer people, each with broader responsibilities
  - **Parallelization** – change the process so that individual step are performed simultaneously

Activity-Based Costing

- Examine the **cost** of each major process or step in a business process rather than time taken.
- Calculate cost of each process step
- Consider both direct and indirect costs
- Identify most costly steps and focus improvement efforts on them

Informal Benchmarking

- Studying how other organizations perform the same business process
- Helps the organization by introducing ideas that employees may never have considered but that have the potential added value.
- Common for customer-facing processes
- Interact with other business' processes as if you are a customer

Outcome Analysis

- Consider desirable outcomes from customers' perspective.
- System analysts encourage the managers and project sponsor to pretend they are customers and consider what the organization could enable the customer to do

Technology Analysis

- Analysts list important and interesting technologies
- Managers list important and interesting technologies
- The group identifies how each might be applied to the business and how the business might benefit

Activity Elimination

- Identify what would happen if each organizational activity were eliminated
- Use “force-fit” to test all possibilities

Comparing Analysis Techniques

1. Potential business value
2. Project cost
3. Breadth of analysis
4. Risk

Project Characteristics

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

Your Turn ☺

For the plan web system, what type of requirements are those:

- Be accessible to web users
- Include the company logo
- Provide management reports
- Includes pictures of the plants
- Print the page
- Restricts access to profitability information

Your Turn ☺

- How do you know whether to use business process automation, business process improvement, or business process reengineering?
- Provide two examples.

1.3 REQUIREMENTS -GATHERING TECHNIQUES

Requirement Gathering Techniques

1. Interviews
2. JAD
3. Questionnaires
4. Document Analysis
5. Observation

Interview

- Most **commonly** used technique
- Basic steps:
  1. Selecting Interviewees
  2. Designing Interview Questions (instrument development)
  3. Preparing for the Interview
  4. Conducting the Interview
  5. Post-Interview Follow-up

Interview: Selecting Interviewees

- Based on information needed
- Create **interview schedule and the purpose** of the interview
- Often good to get different perspectives
  - Managers
  - Users
  - Ideally, all key stakeholders
- People at different levels of the organization have varying perspectives on the systems.
  - **Gain both high-level and low-level perspectives on an issue**

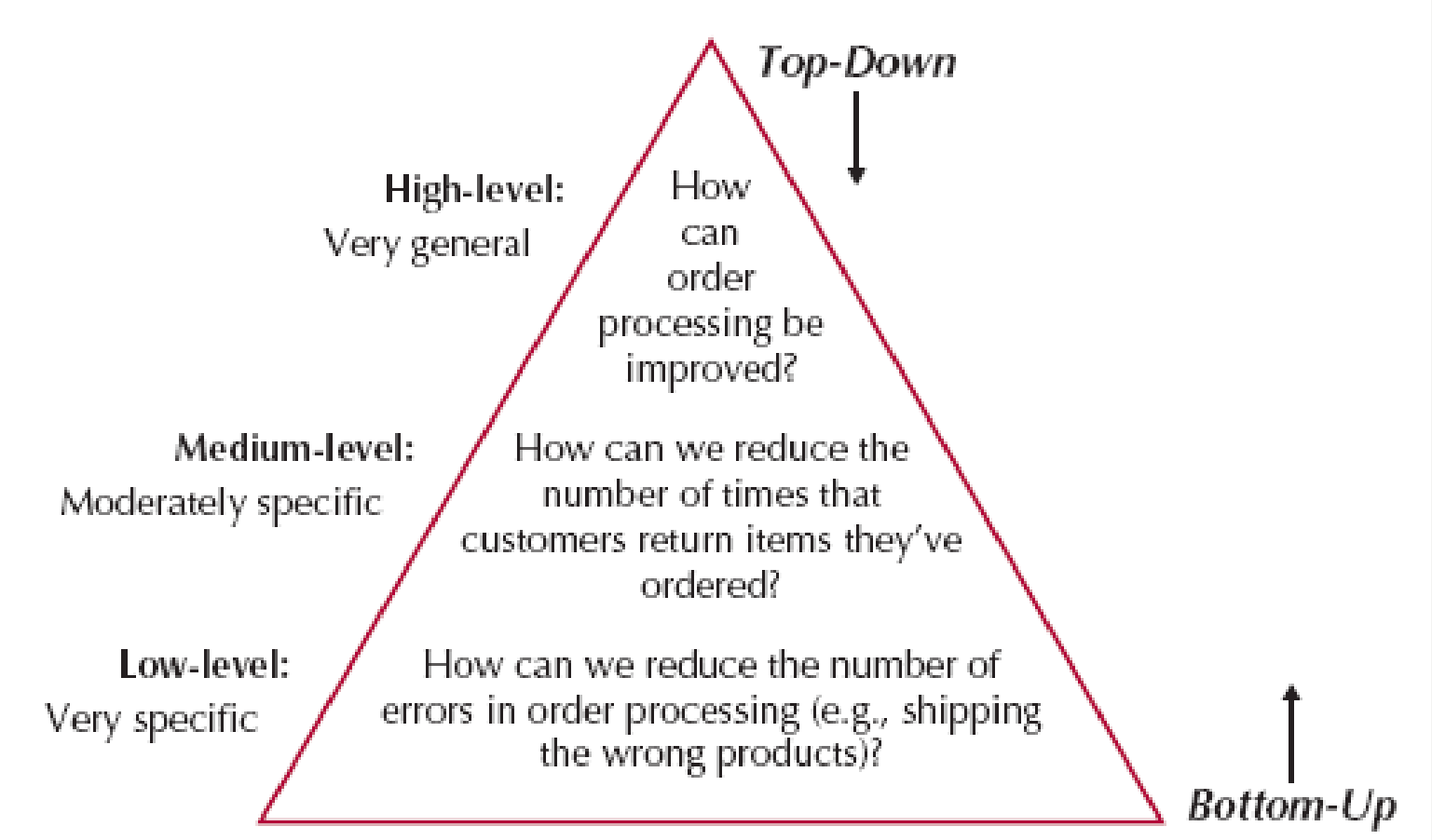
Interview: Three Types of Questions

Types of Questions	Examples
Closed-Ended Questions	• How many telephone orders are received per day? • How do customers place orders? • What additional information would you like the new system to provide?
Open-Ended Questions	• What do you think about the current system? • What are some of the problems you face on a daily basis? • How do you decide what types of marketing campaign to run?
Probing Questions	• Why? • Can you give me an example? • Can you explain that in a bit more detail?

Interview: Designing Interview Questions

- **Unstructured** interview
  - Broad, roughly defined information
  - At the earlier stage of the project
- **Structured** interview
  - More specific information
  - At the later stage of the project

Interview: Designing Interview Questions



Interview: Preparation Steps

- Prepare general interview plan
  - List of question
  - Anticipated answers and follow-ups
- Confirm areas of knowledge
- Set priorities in case of time shortage
- Prepare the interviewee
  - Schedule
  - Inform of reason for interview
  - Inform of areas of discussion

Interview: Conducting the Interview

- Appear professional and unbiased
- Record all information
- Check on organizational policy regarding tape recording
- Be sure you understand all issues and terms
- Separate facts from opinions
- Give interviewee time to ask questions
- Be sure to thank the interviewee
- End on time

Interview: Conducting the Interview

- Don’t worry, be happy
- Pay attention
- Summarize key points
- Be succinct
- Be honest
- Watch body language

Interview: Post-Interview Follow-Up

- Prepare interview notes
- Prepare interview report
- Have interviewee review and confirm interview report
- Look for gaps and new questions

Interview Report

INTERVIEW REPORT
Interview notes approved by: _____ Person interviewed _____ Interviewer _____ Date _____ Primary Purpose: Summary of Interview: Open Items: Detailed Notes:

Your Turn ☺

- **You are interviewing the director of the PC lab at your school regarding a new program to support keeping track of students' borrowing software**
  - With a partner, write 5 questions you would ask the PC lab director
  - Take turns having one pair of students posing the questions to another pair of students
  - Be sure to take notes and write up the results when you have finished.

Joint Application Development (JAD)

- A structured group process focused on determining requirements
- Involves project team, users, and management working together
- May reduce scope creep by 50%
- Very useful technique

JAD: Participants

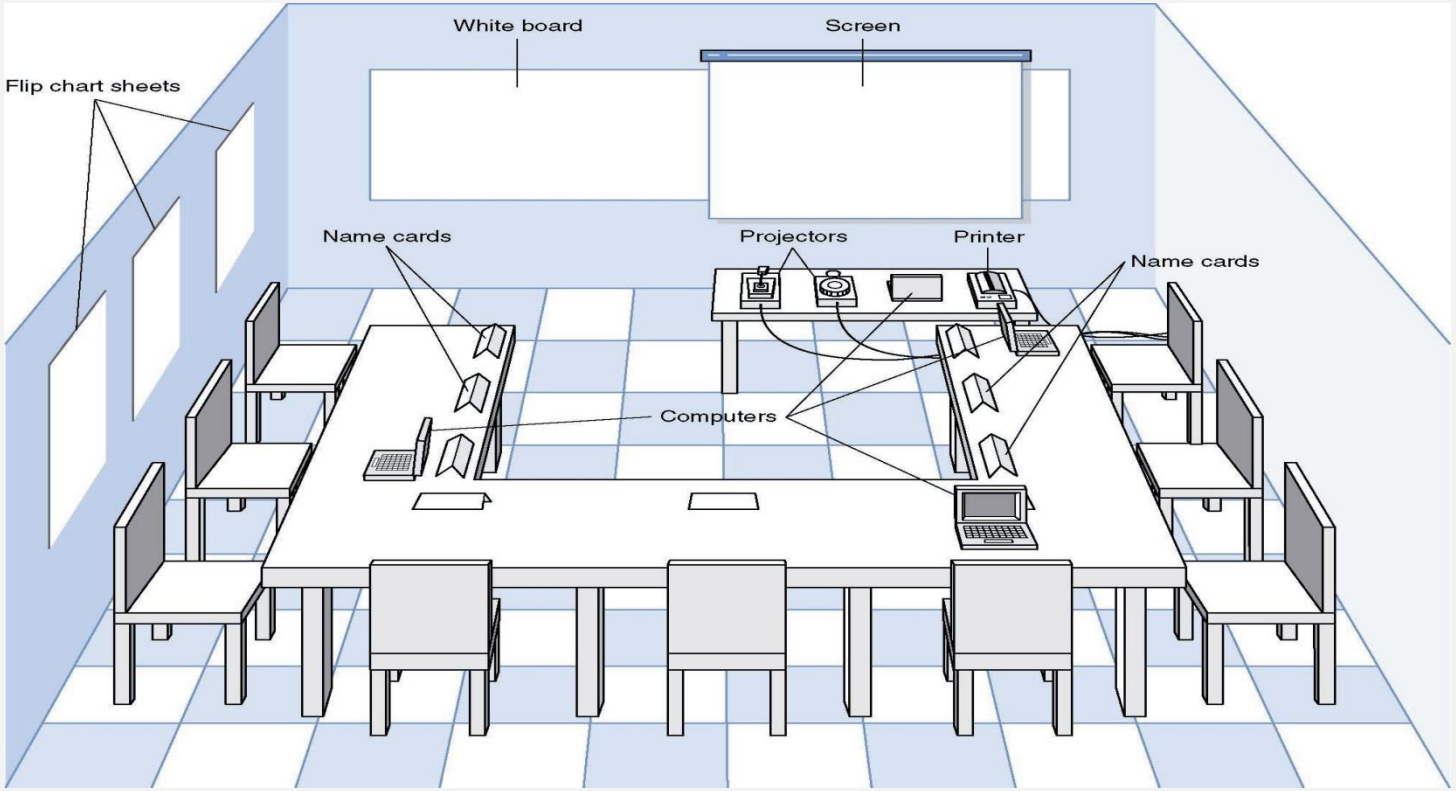
- **Facilitator**
  - Trained in JAD techniques
  - Sets agenda and guides group processes
- **Scribe(s)**
  - Record content of JAD sessions
- **Users and managers from business area with broad and detailed knowledge**

JAD: Designing and Preparing for the JAD Sessions

- It is important that the participants understand what is expected of the JAD session.
- Time commitment – ½ day to several weeks
- Close ended questions are seldom used because do not spark the open and frank discussion
- Strong management support is needed to release key participants from their usual responsibilities
- The JAD session is structured ・ Careful planning is essential
- e-JAD can help alleviate some problems inherent with groups knowledge

JAD: Setting

- U-Shaped seating
- Away from distractions
- Whiteboard/flip chart
- Prototyping tools
- e-JAD



JAD: Conducting the JAD Session

- Prepare questions as with interviews
- Formal agenda and ground rules
- Top-down structure most successful
- Facilitator activities
  - Keep session on track
  - Help with technical terms and jargon
  - Record group input
  - Stay neutral, but help resolve issues
- Post-session follow-up report

JAD: Post JAD Follow-up

- Post-session report is prepared and circulated among session attendees
- The report should be completed approximately a week to two after the JAD session

JAD: Managing Problems in JAD Sessions

- Reducing domination
- Encouraging non-contributors
- Side discussions
- Agenda merry-go-round
- Violent agreement
- Unresolved conflict
- True conflict
- Use humor

Questionnaires

- A set of written questions, often sent to a large number of people
- May be paper-based or electronic
- Select participants using samples of the population
- Design the questions for clarity and ease of analysis
- Administer the questionnaire and take steps to get a good response rate
- Questionnaire follow-up report

Questionnaires: 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.

Document Analysis

- Study of **existing material describing the current system**
- Provides clues about existing **"as-is" system**
- Forms, reports, policy manuals, organization charts describe the **formal system**
- Look for the **informal system** in user additions to forms/report and unused form/report elements
- The most powerful indication that the system needs to be changed is when users create their own forms or add additional information to existing one.

Observation

- Watch processes being performed
- Users/managers often don't remember everything they do
- Checks validity of information gathered other ways
- Be aware that behaviors change when people are watched
- Be unobtrusive
- Careful not to ignore periodic activities
- Weekly … Monthly … Annual
- Identify peak and lull periods

Comparison of Requirements-Gathering Techniques

	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

System Proposal

1. **Table of Contents**
2. **Executive Summary**

   A summary of all the essential information in the proposal so that 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 CRUDE 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.
10. **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

- The analysis process focuses on capturing the business requirements for the system
- Functional and non-functional business requirements tell ***what*** the system must do
- Three main requirements analysis techniques are BPA, BPI, and BPR
- These techniques vary in potential business value, but also in potential cost and risk
- There are five major requirements-gathering techniques that all systems analysts must be able to use: Interviews, JAD, Questionnaires, Document Analysis, and Observation.
- Systems analysts must also know how and when to use each as well as how to combine methods.

References

- Systems Analysis and Design: An Object Oriented Approach with UML 5th ed. Alan Dennis, Barbara Haley Wixom, and Roberta M. Roth © 2015
- http://www.ocdqblog.com/home/comic-relief-dilbert-on-project-management.html