CH3.Requirements Determination

School of Computer Science

Prof. Euijong Lee

Objectives

❖ **Understand how to create a requirement definition**

❖ **Understand the difference between functional requirements and nonfunctional requirements**

❖ **Understand how to gather the requirements**

❖ **Understand when each requirements-gathering technique is used**

Requirements Determination
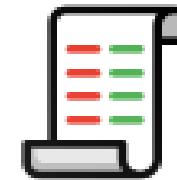
❖ **The single most critical step of the entire SDLC**

❖ **First begin to emerge the major elements of a system**

❖ **Easy to change of system because of … .**

❖ **State the system request into a more precise list of requirements**

Business requirements

- Business perspective
- By business person
- Focus on the "what" of the system
- User Requirements
- Written in RDD

System requirements

- Developer's perspective
- By software engineer
- Focus on the "how" the system will
- System/Software Requirements
- Written in SRS and SDD

What is a Requirement ?

❖ **A statement of what the system must do or what characteristic it must have.**

❖ **Requirements**
- can be changed over time as moves from analysis to design
- can be either functional or nonfunctional

❖ **Functional requirements**
- directly related to a process the system has to perform

❖ **Nonfunctional requirements**
- behavioral properties that the system must have, such as performance

❖ **Interface Requirements**

Requirements Definition

❖ Straightforward text report that simply lists the functional and nonfunctional requirements in an outline format

Another important thing ?

Functional Requirements

1. New Vehicle Management
1.1 The system will allow managers to view the current new vehicle inventory.
1.2 The system will allow the new vehicle manager to place orders for new vehicles.
1.3 The system will record the addition of new vehicles to inventory when they are received from the manufacturers.

2. Vehicle Sales Management
2.1 The system will enable salespersons to create a customer offer.
2.2 The system will allow salespeople to know whether an offer is pending on a specific vehicle.
2.3 The system will enable managers to record approval of a customer offer.
2.4 The system will prepare a sales contract.
2.5 The system will prepare a shop work order based on customer requested dealer options.
2.6 The system will record a customer deposit.
2.7 The system will record a customer payment.
2.8 The system will create a record of the customer's vehicle purchase.

3. Used Vehicle Management
3.1 The system will record information on a customer trade-in vehicle ... etc.

Nonfunctional Requirements

1. Operational
1.1 The system should run on tablet PCs to be used by salespeople.
1.2 The system should interface with the shop management system.
1.3 The system should connect to printers wirelessly.

2. Performance
2.1 The system should support a sales staff of 15 salespeople.
2.2 The system should be updated with pending offers on vehicles every 15 minutes.

3. Security
3.1 No salesperson can access any other salesperson's customer contacts.
3.2 Only the owner and sales manager may approve customer offers.
3.3 Use of each tablet PC should be restricted to the salesperson to whom it is assigned.

4. Cultural and Political
4.1 Company policy says that all computer equipment is purchased from Dell.
4.2 Customer personal information is protected in compliance with the Data Protection Act.
4.3 The system will conform to the state's "lemon law."

(source: Dennis, Alan, Barbara Haley Wixom, and Roberta M. Roth. *Systems analysis and design*. John wiley & sons.)

Requirements Definition

❖ **Another example**

Nonfunctional Requirements

1. Operational Requirements
  1.1. The system will operate in Windows environment.
  1.2. The system should be able to connect to printers wirelessly.
  1.3. The system should automatically back up at the end of each day.

2. Performance Requirements
  2.1. The system will store a new appointment in 2 seconds or less.
  2.2. The system will retrieve the daily appointment schedule in 2 seconds or less.

3. Security Requirements
  3.1. Only doctors can set their availability.
  3.2. Only a manager can produce a schedule.

4. Cultural and Political Requirements
  4.1. No special cultural and political requirements are anticipated.

Functional Requirements

1. Manage Appointments
  1.1. Patient makes new appointment.
  1.2. Patient changes appointment.
  1.3. Patient cancels appointment.

2. Produce Schedule
  2.1. Office Manager checks daily schedule.
  2.2. Office Manager prints daily schedule.

3. Record Doctor Availability
  3.1. Doctor updates schedule
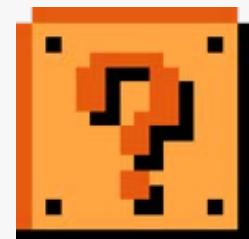
(source: Dennis, Alan, Barbara Haley Wixom, and Roberta M. Roth. *Systems analysis and design*. John wiley & sons.)

Your Turn – Activity

❖ **Which requirements are functional or nonfunctional business requirements in the following list?**

❖ **The System Should …**

1. be accessible to Web users
2. include the company standard logo and color scheme
3. restrict access to profitability information
4. include actual and budgeted cost information
5. provide management report
6. include sales information that is updated at least daily
7. have 2-second max response time for predefined queries
8. provide monthly rankings of salesperson performance
9. include information from all company subsidiaries
10. print subsidiary reports in their language of the subsidiary

Requirement-Gathering Techniques

❖ **The goal of analysis phase**

- to truly understand the requirements of the new system

❖ **Challenges**

- in the first, finding the right people to participate.
- in the second, **collecting and integrating the information**
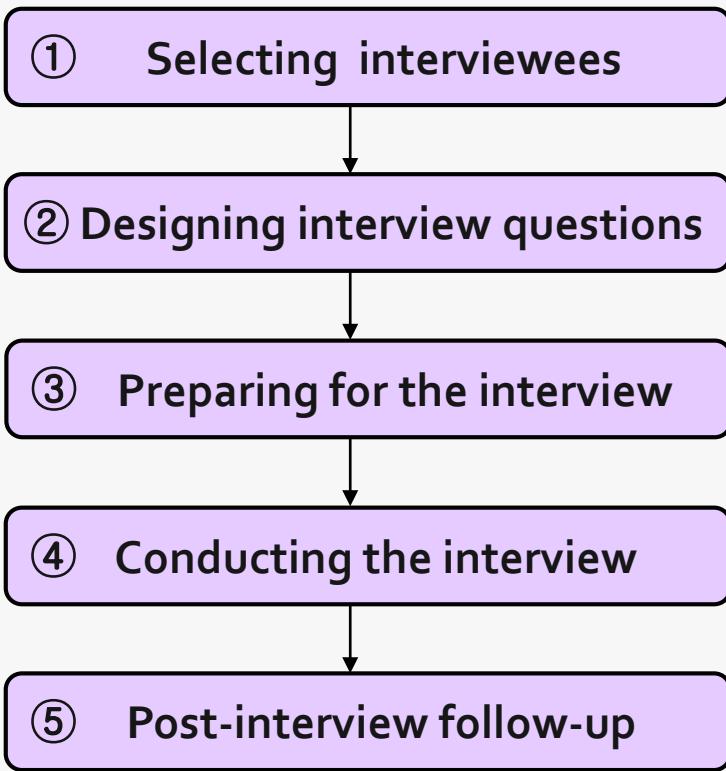
❖ **Techniques**

- interviews
- joint application development
- questionnaires
- document analysis
- observation

Interviews

❖ **Most commonly used requirements-gathering techniques**

❖ **Five Basic Steps of interviews**

Steps	Details
① **Selecting interviewees**	▪ To create an interview schedule that lists all of the people who are interviewed / when /for what. ▪ who will be selected ?
② **Designing interview questions**	▪ Closed-end /Open-end /Probing questions ▪ Unstructured question/ Structured question ▪ Top-down question /Bottom-up questions
③ **Preparing for the interview**	▪ Prepare an interview plan ▪ Inform the reason for the interview to interviewees
④ **Conducting the interview**	▪ Rapport with interviewee ▪ Record all information during the interview ▪ Wrap-up the interview
⑤ **Post-interview follow-up**	▪ Prepare interview report within 48 hours ▪ Send the report to interviewees

Interviews: ① Selecting Interviewees

❖ **Based on information needed**

❖ **Often good to get different perspectives**
- Managers
- Users
- Ideally, all key stakeholders

Interviews: ① Selecting Interviewees

❖ **Interview Schedule (examples)**

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.

Interviews: ② Designing Interview Question

❖ **Unstructured interview**

- Broad, roughly defined information

❖ **Structured interview**

- More specific information

❖ **Types of Questions**

- Closed ended questions
- Open ended questions
- Probing questions

❖ **Questioning Strategies**

- Top down
- Bottom up

Interviews: ② Designing Interview Question

❖ **Types of Questions (examples)**

Type of Questions	Example
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?
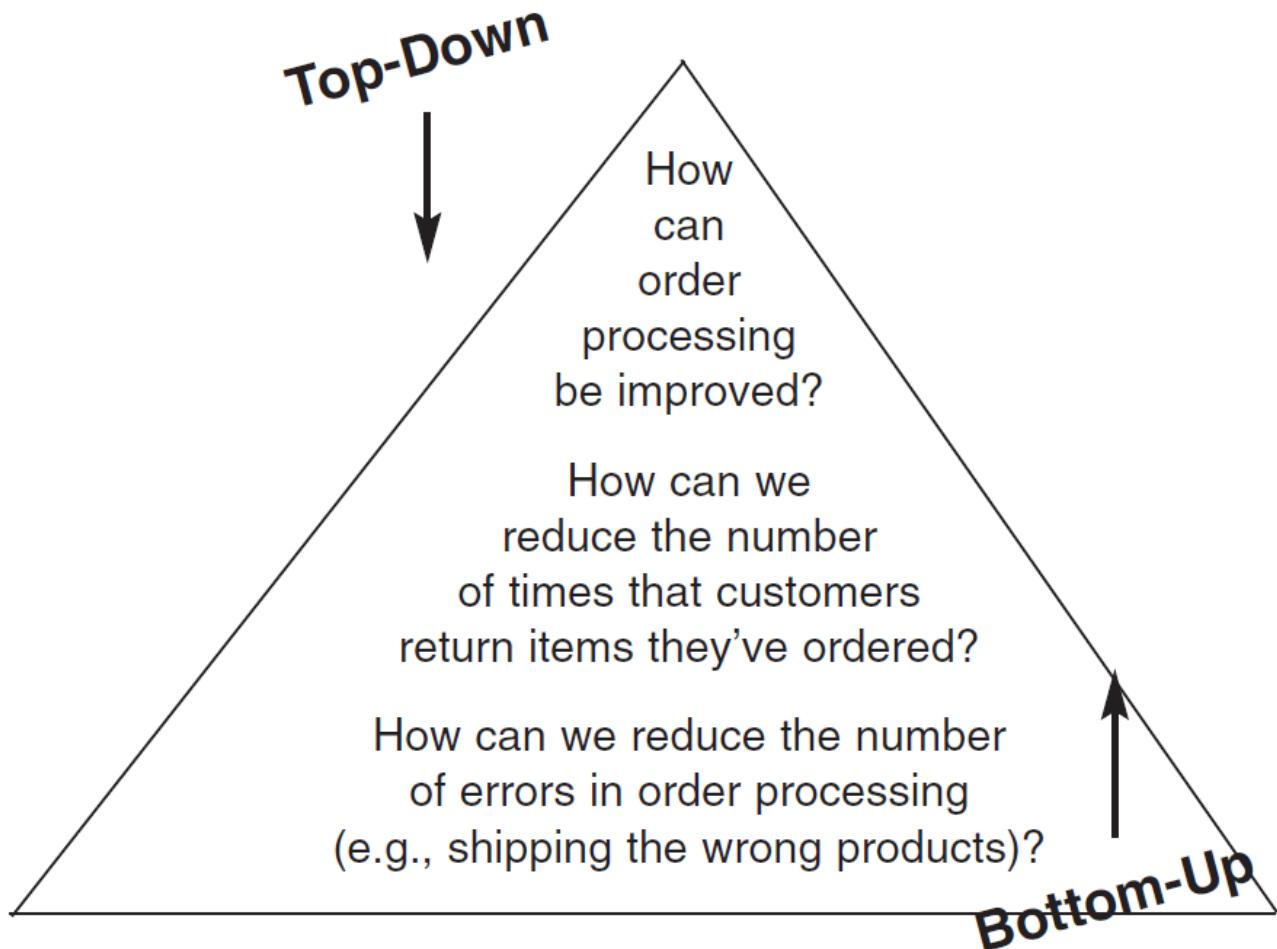
Interviews: ② Designing Interview Question

❖ **Top-down and Bottom-up Questioning Strategies (examples)**

Top-Down

High-level: very general

Medium-level: moderately specific

Low-level: very specific

How can order processing be improved?

How can we reduce the number of times that customers return items they've ordered?

How can we reduce the number of errors in order processing (e.g., shipping the wrong products)?

Bottom-Up

(source: Dennis, Alan, Barbara Haley Wixom, and Roberta M. Roth. *Systems analysis and design*. John wiley & sons.)

Interviews: ③ 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

Interviews: ④ 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

Interviews: ④ Conducting the Interview

❖ **Practical Tips**

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

Interviews: ⑤ Post-Interview Follow-up

❖ **Prepare interview notes / Prepare interview report / Look for gaps and new questions**

Interview Notes Approved by: Linda Estey

Person Interviewed: Linda Estey,
  Director, Human Resources

Interviewer: Barbara Wixom

Purpose of Interview:

- Understand reports produced for Human Resources by the current system.
- Determine information requirements for future system.

Summary of Interview:
- 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.
- Two biggest problems with the current system are:

  1. The data are too old. (The HR Department needs information within 2 days of month end; currently information is provided to them after a 3-week delay.)

  2. The data are of poor quality. (Often, reports must be reconciled with the HR departmental database.)

- The most common data errors found in the current system include incorrect job-level information and missing salary information.

Open Items:
- Get current employee roster report from Mary Skudrna (extension 4355).
- Verify calculations used to determine vacation time with Mary Skudrna.
- Schedule interview with Jim Wack (extension 2337) regarding the reasons for data quality problems.

Detailed Notes: See attached transcript.

(source: Dennis, Alan, Barbara Haley Wixom, and Roberta M. Roth. *Systems analysis and design*. John wiley & sons.)

Your Turn - Activity

❖ **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

1	
2	
3	
4	
5	

# JAD: Joint Application Development
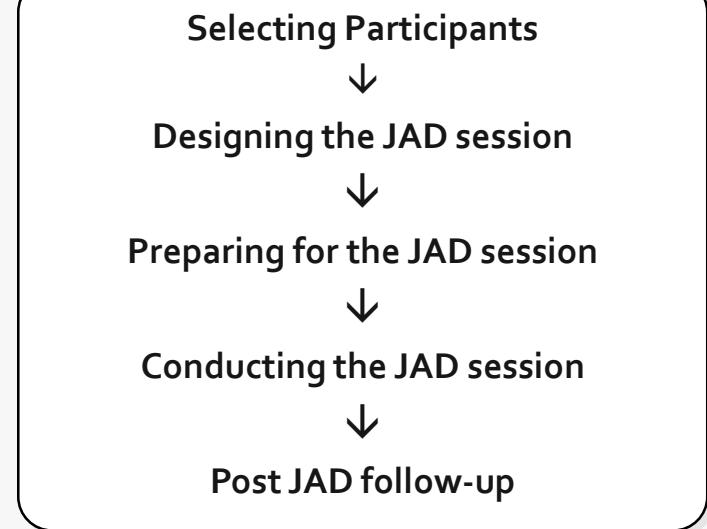
❖ **Key ideas**
- Allows project managers, users, and developers to work together
- May reduce scope creep by 50%
- Avoids requirements being too specific or too vague

❖ **Important Roles in JAD**
- Facilitator
- Scriber

❖ **Who are participants ?**

Steps of JAD

Selecting Participants
↓
Designing the JAD session
↓
Preparing for the JAD session
↓
Conducting the JAD session
↓
Post JAD follow-up
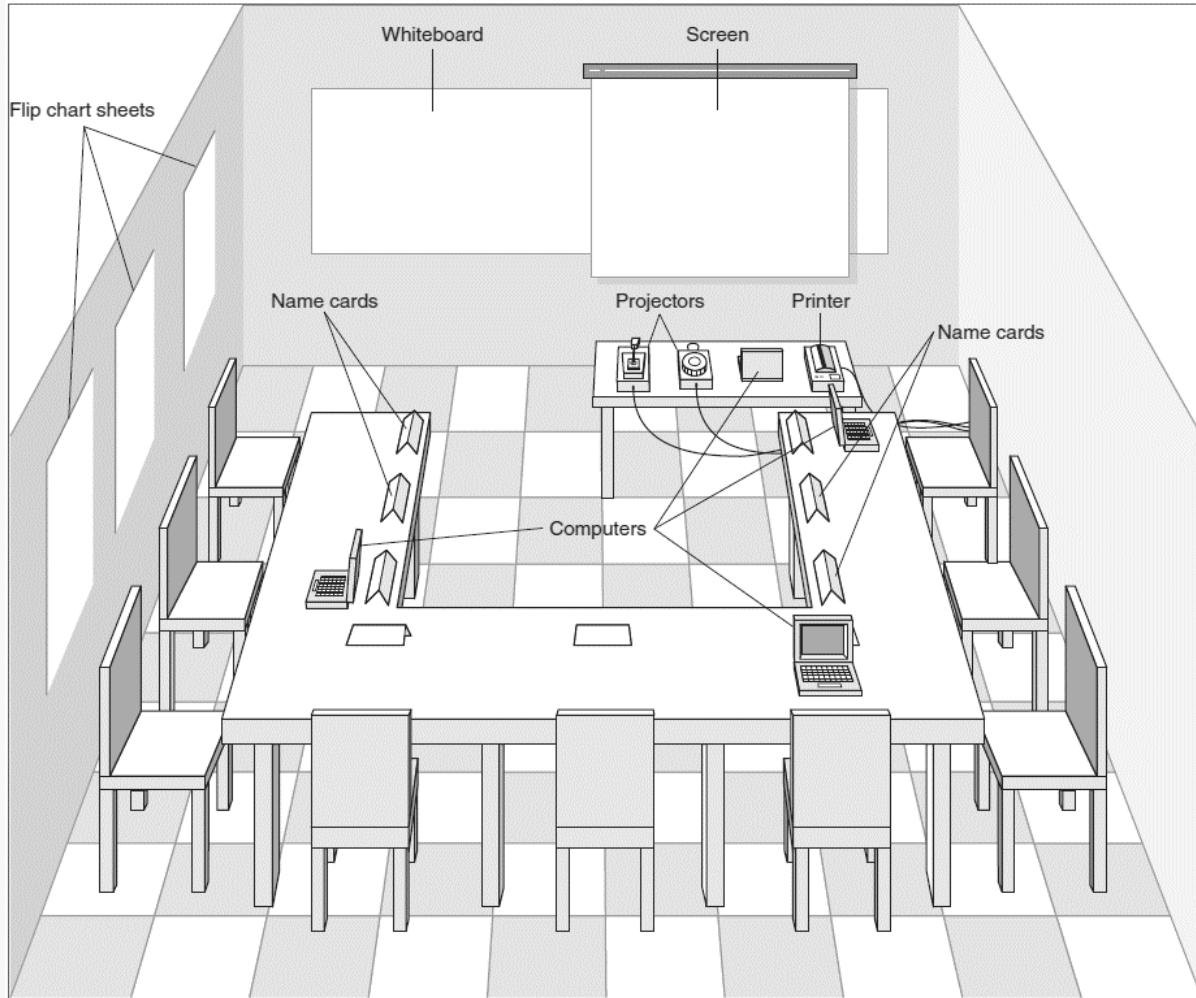
JAD: Setting

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

(source: Dennis, Alan, Barbara Haley Wixom, and Roberta M. Roth. *Systems analysis and design*. John wiley & sons.)

JAD: The JAD Session

❖ **Tend to least 5 to 10 days over a three week period**

❖ **Prepare questions as with interviews**

❖ **Formal agenda and ground rules**

❖ **Facilitator's activities are important**

❖ **Managing Problems in JAD Sessions**

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

hand-up to speak
5 minute speech
stick to the topic

Questionnaire

❖ **Questionnaire**

- a set of written questions for obtaining information from individuals

❖ **Questionnaire Steps**

- **Selecting participants**
    - Using samples of the population
- **Designing the questionnaire**
    - Careful question selection
- **Administering the questionnaire**
    - Working to get good response rate
- **Questionnaire follow-up**
    - Send results to participants

Questionnaire: Good Questionnaire Design

❖ **Begin with non-threatening 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

❖ **Provides clues about existing "as-is" system**

❖ **Typical documents**

- Forms
- Reports
- Policy manuals
- Organization charts

❖ **Look for user additions to forms**

❖ **Look for unused form elements**

Document Analysis : An Example

The customer made a mistake. This should be labeled **Owner's Name** to prevent confusion.

The staff had to add additional information about the type of animal and the animal's date of birth and gender. This information should be added to the new form in the to-be system.

CENTRAL VETERINARY CLINIC
Patient Information Card

Name: ~~Buffy~~ Pat Smith

Pet's Name: Buffy   Collie 7/6/07   Male

Address: 100 Central Court. Apartment 10

Toronto, Ontario K7L 3N6

Phone Number: 416- 555-3400

Do you have insurance: yes

Insurance Company: Pet's Mutual

Policy Number: KA-5493243

The customer did not include area code in the phone number. This should be made more clear.

(source: Dennis, Alan, Barbara Haley Wixom, and Roberta M. Roth. *Systems analysis and design*. John wiley & sons.)

Observation
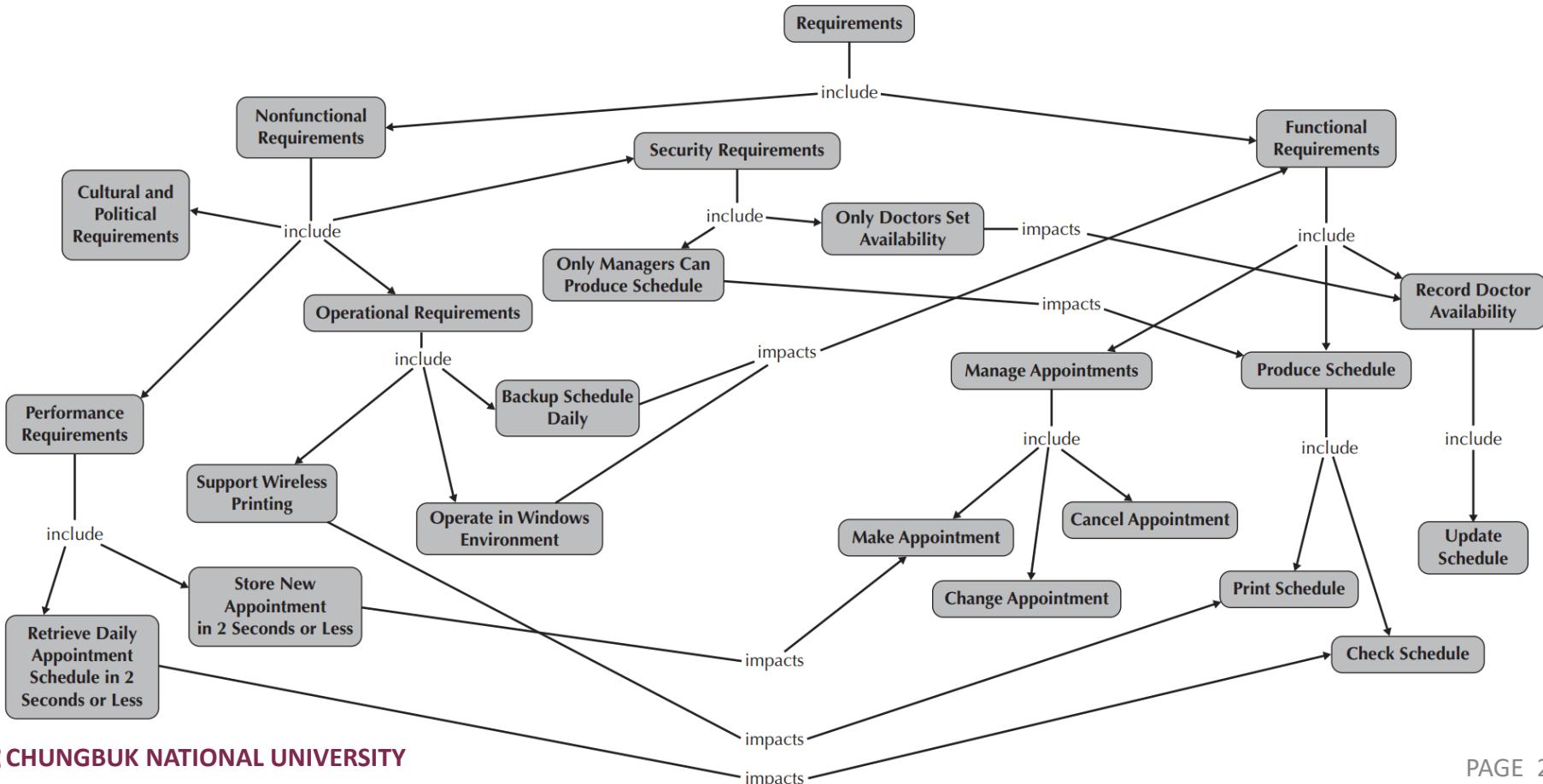
❖ **The act of watching processes being performed**

❖ **Users/managers often don't remember everything they do**

❖ **Checks validity of information gathered other ways**

❖ **Behaviors change when people are watched**

❖ **Careful not to ignore periodic activities**
- Weekly … Monthly … Annual

Requirements Determination

❖ **Concept map**
- Concept maps represent meaningful relationships between concepts.
- Useful for focusing individuals on the small number of key ideas on which they should concentrate

- **Sample of requirement of concept map (see slide 6)**

Selecting the Appropriate 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

Contents of Deliverables (,)

❖ **Contents from requirement definition**

- Functional Requirements
- Nonfunctional Requirements

❖ **System Proposal**

- **Document which is combining all of deliverables from project**
- **Contents**
  - Executive summary
  - System request
  - Workplan
  - Requirement definition
  - Feasibility analysis
  - Functionality description
  - Appendices

Summary and Discussion

❖ **There are five major information gathering techniques that all systems analysts must be able to use:**

- Interviews
- JAD
- Questionnaires
- Document Analysis, and
- Observation.

❖ **What is the purpose of the requirements definition ?**

❖ **Explain the difference between an AS-IS system and**

 TO-BE system ?

ADDITIONAL: Requirements Analysis Strategies

❖ **Problem Analysis**

- Asking the users and managers to identify problems with the as-is system and to describe how to solve them in the to-be system.

❖ **Root Cause Analysis**

- Problem analysis tend to be solutions to problems
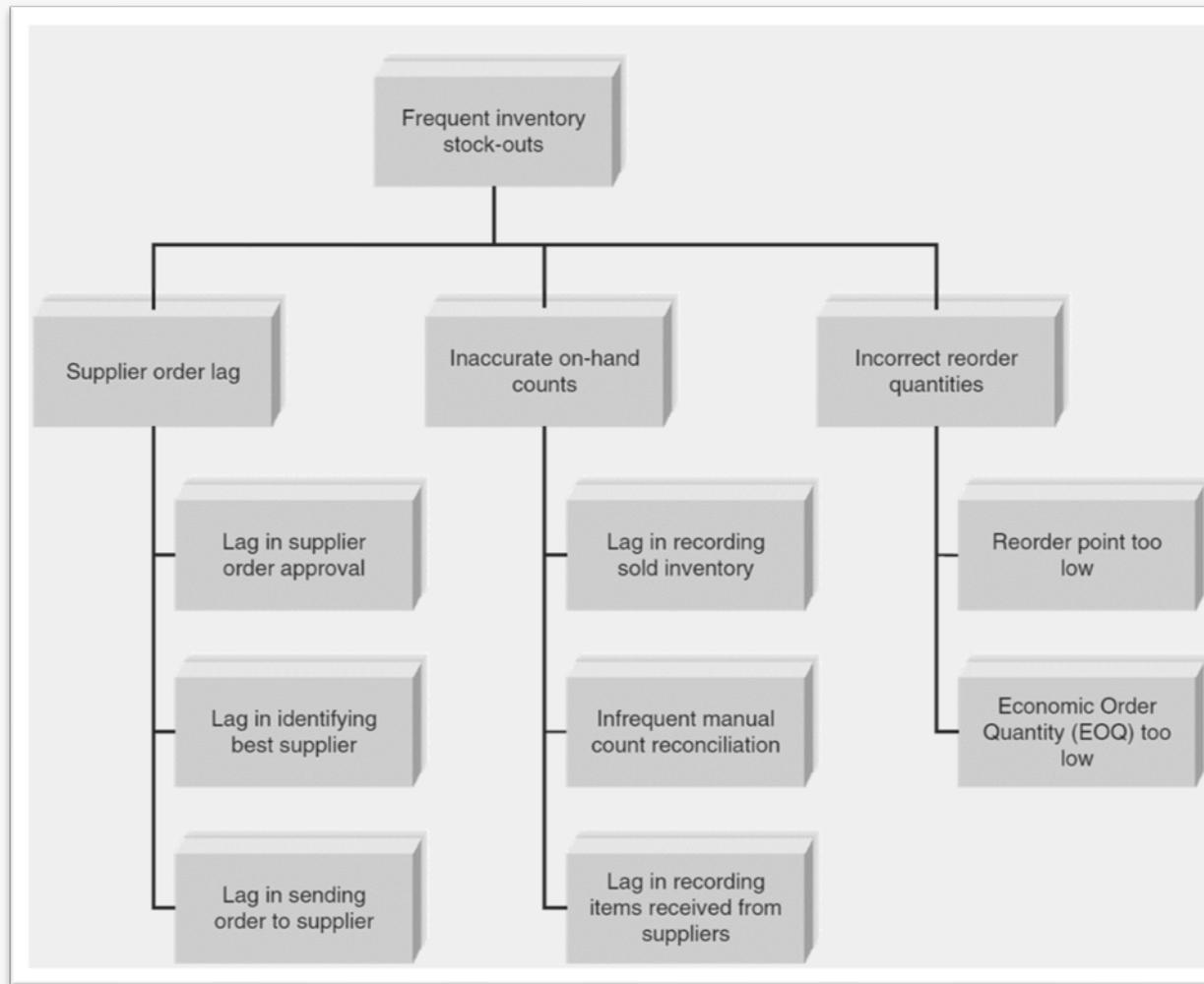
❖ **Duration Analysis**

- Duration analysis requires a detailed examination of the amount of time it takes to perform each process in the current as-is system.

ADDITIONAL: Requirements Analysis Strategies

❖ **Example of Root Cause Analysis**

ADDITIONAL: Requirements Analysis Strategies

❖ **Activity-Based Costing**

- Activity-based costing is a similar analysis that examines the cost of each major process or step in a business process rather than the time taken

❖ **Informal Benchmarking**

- Benchmarking refers to studying how other organizations perform a business process in order to learn how your organization can do something better
- Informal benchmarking is fairly common for "customer-facing" business processes (i.e., those processes that interact with the customer)

ADDITIONAL: Requirements Analysis Strategies

❖ **Outcome Analysis**

- Outcome analysis focuses on understanding the fundamental outcomes that provide value to customers

❖ **Technology Analysis**

- Technology analysis starts by having the analysts and managers develop a list of important and interesting technologies

❖ **Activity Elimination**

- The analysts and managers work together to identify how the organization could eliminate each and every activity in the business process