Lecture04: Software Requirements (II)

EGCI340: SOFTWARE DESIGN

Review

- What are the differences between functional and non-functional requirement
- For vending machine, user can select one preferred beverage. What are the system requirements for this user requirement?

Outline

Requirement Document

Requirements Engineering Processes

Feasibility Studies

Elicitation and Analysis

Requirement Discovery

Interviewing

Requirement Review

Requirement Management

Requirement Documents

- Requirement document is the official statement of what is required of the system developers
- Include :
  - Definition of user requirements
  - Specification of the system requirements

- It is NOT a design document
- It should set of WHAT the system should do rather than HOW it should do

IEEE Requirement Standard

Define a generic structure for a requirement document

- Must be instantiated for each specific system

  - List of Sections
  - Introduction
  - General description
  - Specific requirements
  - Appendices
  - Index

Requirements Document Structure

- Preface
- Introduction
- Glossary
- User requirements definition
- System architecture
- System requirements specification
- System models
- System evolution
- Appendices
- Index

Requirements Engineering Processes

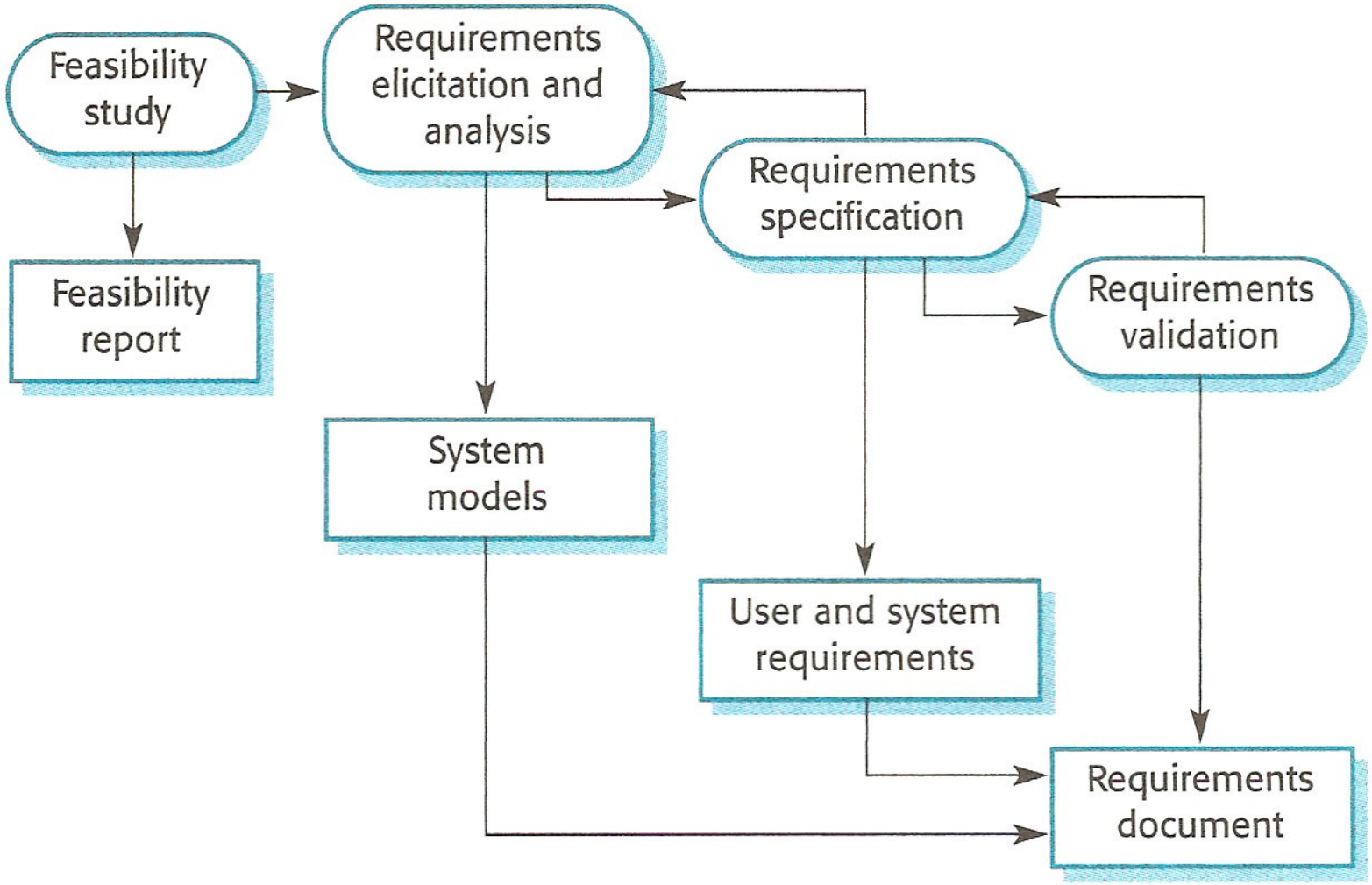
The processes used for Requirement Engineering (RE) vary widely depending on:

- Application domain
- People involved
- Organization developing the requirements

Requirement Activities

- Requirements elicitation (ask questions, define scope, and search for new techniques)
- Requirements analysis
- Requirement specification
- Requirements validation (check that there are no conflicts between requirements)
- Requirements management

Requirements Engineering Processes [1]



Feasibility Studies

A short focused study that checks

- If the system contributes to organizational objectives
- If the system can be engineered using current technology and within budget
- If the system can be integrated with other systems that are used

Feasibility Study Implementation

Based on information assessment (what is required), information collection and report writing

List of Questions

- What if the system was not implemented?
- What are current process problems?
- How will the proposed system help?
- What will be the integration problems?
- Is new technology needed? What skills?
- What facilities must be supported by the proposed system?

Elicitation and Analysis

Requirement elicitation or Requirement discovery

Involve technical staff working with customers to find out about:

- Application domain
- Services that the system should provide
- System's operational constraints

Stakeholders

- End-users, managers, engineers

Problems of Requirement Analysis

- Stakeholders do not know what they really want
- Stakeholders express requirements in their own terms
- Different stakeholders may have conflicting requirements
- Organizational and political factors may influence the system requirements
- Requirements change during the analysis process
- New stakeholders may emerge and the business environment change

Viewpoints

- Viewpoints are a way of structuring the requirements
  - To represent the perspectives of different stakeholders
- Stakeholders may be classified under different viewpoints
- Multi-perspective analysis is important
  - There is no single correct way to analyze system requirements

Type of Viewpoints

Interactor viewpoints

- People or other systems that interact directly with the system
- In an ATM, the customer's and the account's database are interactor VPs

Indirect viewpoints

- Stakeholders who do not use the system themselves but who influence the requirements
- In an ATM, management and security staffs are indirect viewpoints

Domain viewpoints

- Domain characteristics and constraints that influence the requirements
- In an ATM, an example would be standards for inter-bank communications

Interviewing

Informal interviewing:

- Team puts questions to stakeholders about the system that they use and the system to be developed

There are two types of interview

- Closed interviews where a pre-defined set of questions are answered
- Open interviews where there is no pre-defined agenda and a range of issues are explored with stakeholders

Interviews in Practice

Mix of closed and open-ended interviewing

Interviews are *good for* getting an overall understanding of:

- What stakeholders do
- How they might interact with the system

Effective Interviewers

- Interviewers should be:
  - Open-minded
  - Willing to listen to stakeholders
  - Should not have pre-conceived ideas about the requirements

- They should prompt the interviewee with a question or a proposal
- They should not simply expect them to respond to a question such as *'what do you want'*

Scenarios

Scenarios are real-life examples of how a system can be used

Scenarios should include:

- Description of the starting situation
- Description of the normal flow of events
- Description of what can go wrong
- Information about other concurrent activities
- Description of the state when the scenario finishes

Use Cases

Use-cases are a scenario based technique in the UML which:

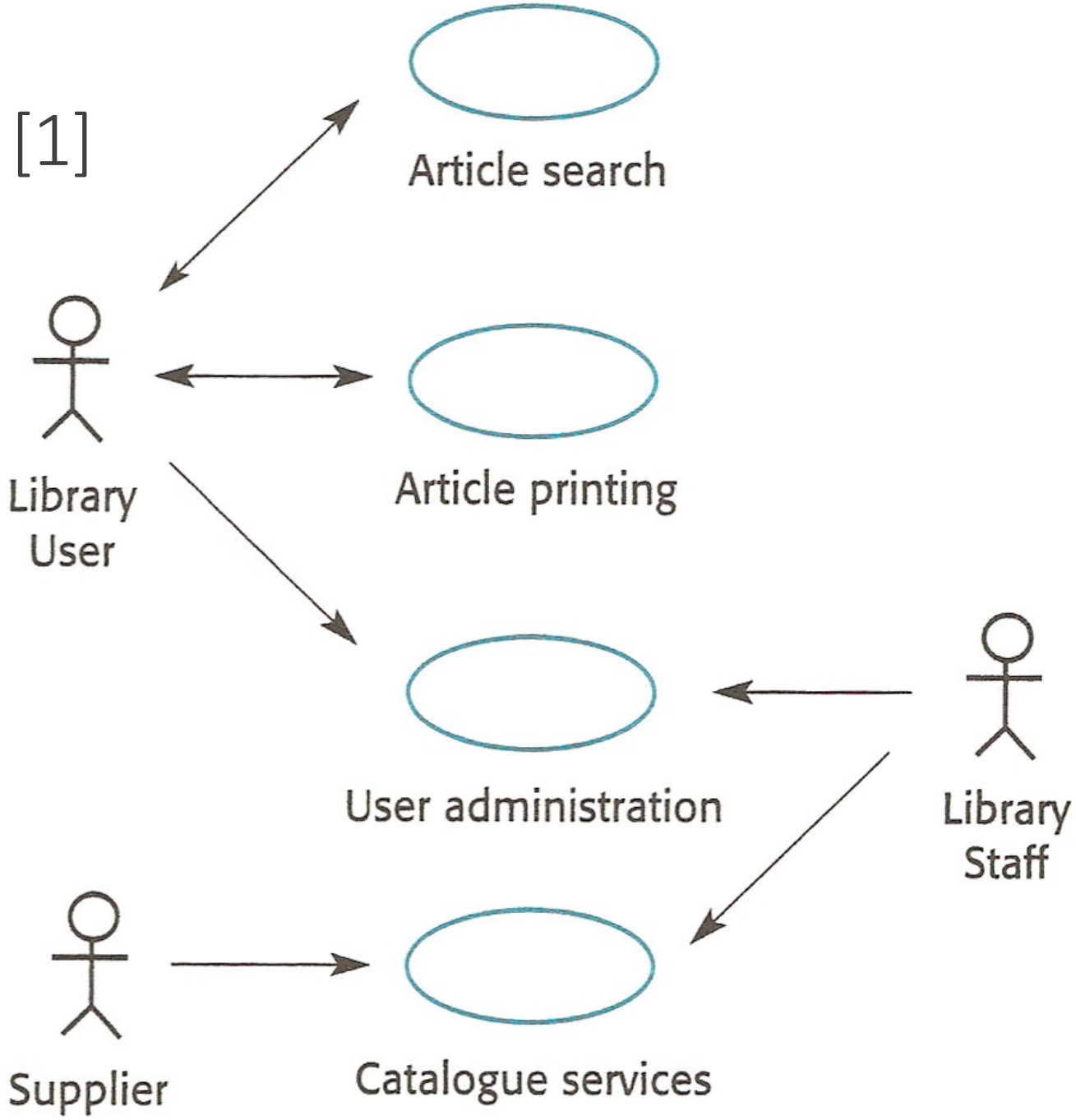
- Identify the actors in an interaction
- Describe the interaction itself

A set of use cases should describe all possible interactions with the system

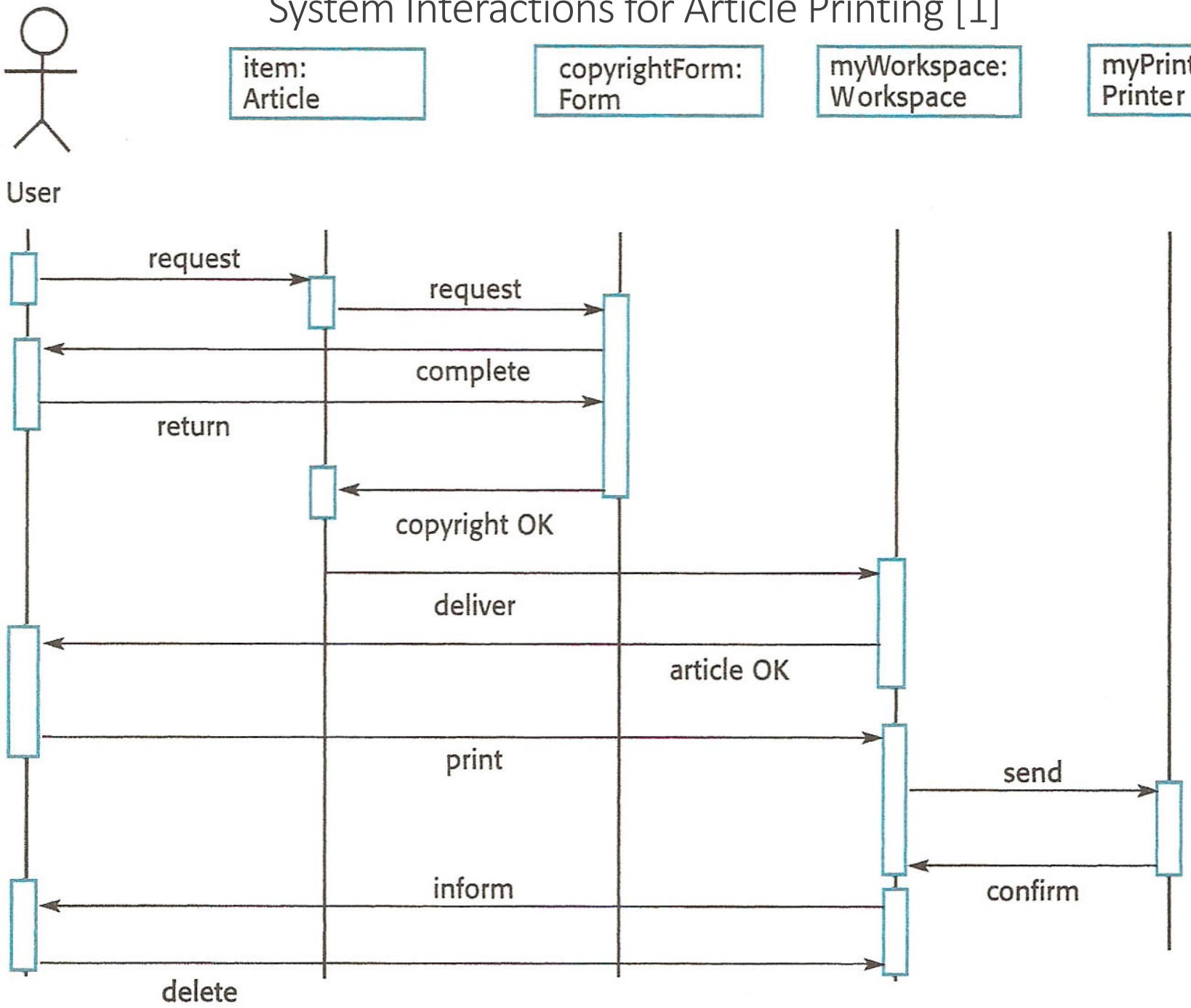
Sequence diagrams may be used to add detail to use-cases

- By showing the sequence of event processing in the system

Use Cases (Cont.) [1]



System Interactions for Article Printing [1]



Requirement Validation Techniques

Requirement reviews

- Systematic manual analysis of the requirements

Prototyping

- Using an executable model of the system to check requirements

Test-case generation

- Developing tests for requirements to check testability

Requirement Reviews

- Regular reviews should be held while the requirements definition is being formulated
- Both client and contractor staff should be involved in reviews
- Reviews may be formal (with completed documents) or informal
- Good communications between developers, customers and users can resolve problems at an early stage

Requirement Management

Requirements management:

- The process of managing change requirements during the requirements engineering process and system development

Requirements are inevitably incomplete and inconsistent

- New requirements emerge during the process as
  - Business needs change
  - A better understanding of the system is developed
- Different viewpoints have different requirements
  - These are often contradictory

Requirement Management Planning

During the requirement engineering process, you have to plan:

- Requirements identification
  - How requirements are individually identified
- Change management process
  - The process followed when analyzing a requirements change
- Traceability policies
  - The amount of information about requirements relationships that is maintained
- CASE tool support
  - The tool support required to help manage requirements change.

Requirement Change

The priority of requirements from different viewpoints changes during the development process

System customers may specify requirements from a business perspective that conflict with end-user requirements

The business and technical environment of the system changes during its development

Requirement Change Management

Principal stages:

- Problem analysis
- Discuss requirements problem and propose change
- Change analysis and costing
- Assess effects of change on other requirements
- Change implementation
- Modify requirements' document and other documents to reflect change

Reference

1. Ian Sommerville, Software Engineering 10th Edition, Pearson, April 2015

Any Questions?

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Thank you