Requirements Engineering
Course Summary
## Course outline

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Lecture 1: Specification / Documentation

1 Introduction
   - Purpose
   - Scope
   - Definitions, acronyms, abbreviations
   - Reference documents
   - Overview

2 Overall Description
   - Product perspective
   - Product functions
   - User characteristics
   - Constraints
   - Assumptions and Dependencies

3 Specific Requirements

Appendices

Index

Identifies the product, & application domain

Describes contents and structure of the remainder of the SRS

Describes all external interfaces: system, user, hardware, software; also operations and site adaptation, and hardware constraints

Summary of major functions, e.g. use cases

Anything that will limit the developer’s options (e.g. regulations, reliability, criticality, hardware limitations, parallelism, etc)

All the requirements go in here (i.e. this is the body of the document). IEEE STD provides 8 different templates for this section
Lecture 1: RE framework

System context
- Subject facet
- Usage facet
- IT system facet
- Development facet

Core activities
- Documentation
- Elicitation
- Negotiation

Requirements artefacts
- Goals
- Scenarios
- Solution oriented requirements

Validation

Management
Lecture 2:  
Elicitation Techniques

• **Traditional techniques**  
  • Reading existing documents  
  • Analyzing hard data  
  • Interviews  
    • Open-ended  
    • Structured  
  • Surveys / Questionnaires  
  • Meetings

• **Collaborative techniques**  
  • Focus Groups  
    • Brainstorming  
    • JAD/RAD workshops  
  • Prototyping  
  • Participatory Design

• **Contextual (social) approaches**  
  • Ethnographic techniques  
    • Participant Observation  
    • Ethnomethodology  
  • Discourse Analysis  
    • Conversation Analysis  
    • Speech Act Analysis  
  • Sociotechnical Methods  
    • Soft Systems Analysis

• **Cognitive techniques**  
  • Task analysis  
  • Protocol analysis  
  • Knowledge Acquisition Techniques  
    • Card Sorting  
    • Laddering  
    • Repertory Grids  
    • Proximity Scaling Techniques
Lecture 2:
Requirements negotiation

• **The goal of negotiation**
  – Identify conflicts
  – Analyse the causes of each conflict
  – Resolve the conflicts by means of appropriate strategies
  – Document the conflict resolution and the rationale

• **Resolve conflicts at the goal level**
  – Goals document rationale of the solution-oriented requirements
  – Fundamental contradictions can be resolved before the stakeholders go into technical details (of the goals realisation)
Lecture 3: Requirements prioritisation

- **Calculate return on investment**
  - Assess each requirement’s importance to the project as a whole
  - Assess the relative cost of each requirement
  - Compute the cost-value trade-off:
Lecture 3: Requirements Traceability
Lecture 4:
Goal Modelling

• **Relationships between goals:**
  - One goal **helps** achieve another (+)
  - One goal **hurts** achievement of another (-)
  - One goal **makes** another (++)
    - Achievement of goal A guarantees achievement of goal B
  - One goal **breaks** another (--) 
    - Achievement of goal A prevents achievement of goal B

• **Goal Elaboration:**
  - “**Why**” questions explore higher goals (context)
  - “**How**” questions explore lower goals (operations)
  - “**How else**” questions explore alternatives
Lecture 5: Scenario modelling

| Use Case ID: |  |
| Use Case Name: |  |
| Created By: | Last Update |
| Date Created: | Date Last Updated |

| Actors: |  |
| Description: |  |
| Trigger: |  |
| Preconditions: | 1. |
| Postconditions: | 1. |
| Normal Flow: | 1. |
| Alternative Flows: |  |
| Exceptions: |  |
| Includes: |  |
| Priority: |  |
| Frequency of Use: |  |
| Business Rules: |  |
| Special Requirements: |  |
| Assumptions: |  |
| Notes and Issues: |  |

Diagram:
- Accountant
- Add new staff member
- Add new staff grade
- Change rate for the client
- Change grade for the staff member
- Calculate staff bonuses
Lecture 6: Requirements Modelling

Entity: entrance door
Entity: glass break detector

Data model

Requirement (natural language)
If a glass break detector attached to the entrance door detects that the entrance door has been damaged, the system shall enter the alarm state and inform the security company.

Behavioural model

State: alarm state
Event: entrance door damaged
Event: inform security company

Transition diagram

Data flow diagram
Function: inform security company
Lecture 7: Validation – quality assessment

- Physical quality
- Empirical quality
- Syntactic quality
- Semantic quality
- Pragmatic quality
- Perceived semantic quality
- Social quality
- Organisational quality
Practicals 0 – Applying criteria for good requirements
Practicals 1 – Initial requirements specification
Practicals 2 – Requirements management
Practicals 3 – Actor and goal modelling
Practicals 4 – Scenario modelling
Practicals 5 – Requirements modelling
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