Requirements Engineering

Course Summary
# Course outline

<table>
<thead>
<tr>
<th>Day</th>
<th>Date</th>
<th>Topic</th>
<th>Lecturer/ Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>L1</td>
<td>12.September</td>
<td>RE framework, Requirements specification</td>
<td>Raimundas</td>
</tr>
<tr>
<td>L2</td>
<td>26.September</td>
<td>Requirements elicitation Requirements negotiation</td>
<td>Raimundas</td>
</tr>
<tr>
<td>L3</td>
<td>10.October</td>
<td>Requirements managements</td>
<td>Raimundas</td>
</tr>
<tr>
<td>L4</td>
<td>24.October</td>
<td>Goals</td>
<td>Mubashar, Raimundas, 28.October, room 111 &amp; 405</td>
</tr>
<tr>
<td>L5</td>
<td>7. November</td>
<td>Scenarios</td>
<td>Mubashar, Raimundas, 11.November, room 111 &amp; 405</td>
</tr>
<tr>
<td>L6</td>
<td>21.November</td>
<td>Requirements modelling</td>
<td>Raimundas</td>
</tr>
<tr>
<td>L7</td>
<td>5.December</td>
<td>Requirements validation</td>
<td>Raimundas</td>
</tr>
<tr>
<td>L8</td>
<td>19.December</td>
<td><strong>Requirements engineering workshop</strong></td>
<td>Raimundas</td>
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</table>
Where are the challenges?
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
    - Enthnomet hodology
  - 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
# 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

<table>
<thead>
<tr>
<th>Section</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Introduction</td>
<td>Identifies the product, &amp; application domain</td>
</tr>
<tr>
<td>2 Overall Description</td>
<td>Describes contents and structure of the remainder of the SRS</td>
</tr>
<tr>
<td></td>
<td>Describes all external interfaces: system, user, hardware, software; also operations and site adaptation, and hardware constraints</td>
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<tr>
<td></td>
<td>Summary of major functions, e.g. use cases</td>
</tr>
<tr>
<td></td>
<td>Anything that will limit the developer’s options (e.g. regulations, reliability, criticality, hardware limitations, parallelism, etc)</td>
</tr>
<tr>
<td></td>
<td>All the requirements go in here (i.e. this is the body of the document). IEEE STD provides 8 different templates for this section</td>
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</table>
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)
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:

![Graph showing cost vs. value for different priority levels](image)
Requirements Traceability
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

- Earn an income → Get good grade
- Study hard → Get full time job
- Get full time job → Attend lectures
Scenario modelling

<table>
<thead>
<tr>
<th>Use Case ID:</th>
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</thead>
<tbody>
<tr>
<td>Use Case Name:</td>
<td></td>
</tr>
<tr>
<td>Created By:</td>
<td>Last Update</td>
</tr>
<tr>
<td>Date Created:</td>
<td>Date Last Update</td>
</tr>
</tbody>
</table>

- **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
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

Functional model

Data flow diagram
Function: inform security company
Validation Goal

- Check whether the outputs of activities fulfill defined quality criteria
- Check whether the execution of activities adheres to process definitions and activity guidelines
- Check whether the inputs of activities fulfill defined quality criteria
Modalities and Assessment

- Class exercises – 3 points each
- Workshop – 40 points
- Exam – 50 points
Modalities and Assessment

• **Class exercises** – 3 points each
  
  If you have performed all 6 exercises, you will be awarded 2 bonus points!

• **Workshop** – 40 points

• **Exam** – 50 points
Modalities and Assessment

• **Class exercises** – 3 points each
  If you have performed all 6 exercises, you will be awarded 2 bonus points!

• **Workshop** – 40 points

• **Exam** – 50 points

  **Exam times:**
  (1) **09.January, 2020**, 14:00-18:00, room 405
  (2) **16.January, 2020**, 14:00-18:00, room 111
  Resit – **23.January, 2020**, 14:00-18:00, room 403
Modalities and Assessment

- **Class exercises** – 3 points each
  
  If you have performed all 6 exercises, you will be awarded 2 bonus points!

- **Workshop** – 40 points

- **Exam** – **50 points**

To be admitted to the exam, at least 35 points of the grade from the exercises and workshop need to be collected during the semester.
Consultation before exam

• (not obligatory!!)

8.January, 14:00-15:00