Topics

- Principles of Requirements Determination
- Requirements Elicitation
- Requirements Negotiation and Validation
- Requirements Management
- Problem Statements for Case Studies
- Requirements Business Model
- Requirements Document
Principles of requirements determination

- **Requirements define**
  - System services
    - Function requirements
    - Data requirements
  - System constraints

Requirements elicitation

Customer

Domain Expert

Domain Knowledge Requirements

Business Analyst

Use Case Requirements

Business Model

Business Class Model

Business Use Case Model
Traditional methods of requirements elicitation

- Interviewing customers and domain experts
- Questionnaires
- Observation
- Study of documents and software systems

Interviewing customers and domain experts

- Structured interview
  - Open-ended questions
  - Close-ended questions
- Unstructured interview
- Questions to be avoided
  - Opinionated questions
  - Biased questions
  - Imposing questions
Questionnaires

- In addition to interviews
- Close-ended questions
  - Multiple-choice questions
  - Rating questions
  - Ranking questions

Observation

- Passive
- Active

  - Carried for a prolonged period of time
  - People tend to behave differently
Study of documents and software systems

- Use case requirements
  - Organizational documents
  - System forms and reports

- Domain knowledge requirements
  - Domain journals and reference books
  - ERPS-s

Modern methods of requirements elicitation

- Prototyping
- Joint Application Development (JAD)
- Rapid Application Development (RAD)
Prototyping

- Throw-away prototype
- Evolutionary prototype

JAD

- The membership
  - Leader
  - Scribe
  - Customers
    - Users
    - Managers
  - Developers
## RAD

- Evolutionary prototyping
- CASE tools
- Specialists with Advanced Tools (SWAT)
- Interactive JAD
- Timeboxing

## Requirements dependency matrix

<table>
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<th>Requirement</th>
<th>R1</th>
<th>R2</th>
<th>R3</th>
<th>R4</th>
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<tr>
<td>R4</td>
<td></td>
<td></td>
<td>Overlap</td>
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**Requirements risks**

- Technical
- Performance
- Database integrity
- Development process
- Political
- Legal
- Volatility

**Requirements management**

- Requirements identification and classification
- Requirements hierarchies
- Change management
- Requirements traceability
**Requirements identification and classification**

- Unique identifier
- Sequential number with document hierarchy
- Sequential number with requirement’s category
- Database generated unique identifier

**Requirements hierarchies**

1. "The system shall schedule the next phone call to a customer upon telemarketer's request."
   
   1.1 “The system shall activate Next Call push button upon entry to Telemarketing Control form or when the previous call has terminated.”
   
   1.2 “The system shall remove the call from the top of the queue of scheduled calls and make it the current call.”
   
   1.3 etc.
Telemarketing example

- Telemarketing
  - The campaigns are planned on recommendation from the society trustees
  - The campaigns have to be approved by the local government
  - The design and planning of campaigns is supported by a separate Campaign Database application system
  - There is also a separate Supporter Database that stores and maintains information about all past and present supporters – used to select supporters to be contacted in a particular campaign
  - Orders from supporters for lottery tickets are recorded during telemarketing for perusal by the Order Processing system
  - Order Processing System maintains status of orders in the Supporter Database
System scope model

- Campaign Database
- Supporter Database
- Conversation
- Outcome
- Ticket Placement
- Ticket Order
- Supporter

Business use case model

- Schedule Phone Conversation
- Telemarketer
- CRUD Campaign and Supporter Details
- Supporter
- Enter Conversation
- Outcome
### Business class model

- **Campaign**
- **CallScheduled**
- **Supporter** (from Use Case View)
- **CampaignTicket**
- **CallOutcome**
- **Telemarketer** (from Use Case View)

### Requirements document

#### Requirements Document

**Table of Contents**

1. Project Preliminaries
   1.1 Purpose and Scope of the Product
   1.2 Business Context
   1.3 Stakeholders
   1.4 Ideas for Solutions
   1.5 Document Overview
2. System Services
   2.1 The Scope of the System
   2.2 Function Requirements
   2.3 Data Requirements
3. System Constraints
   3.1 Interface Requirements
   3.2 Performance Requirements
   3.3 Security Requirements
   3.4 Operational Requirements
   3.5 Political and Legal Requirements
   3.6 Other Constraints
4. Project Matters
   4.1 Open Issues
   4.2 Preliminary Schedule
   4.3 Preliminary Budget

**Appendices**
- Glossary
- Business Documents and Forms
- References
Project preliminaries chapter

- Targets managers and decision makers
- Begins with purpose and scope of the project
- Makes a business case for the system
- Identifies stakeholders
- Offers initial ideas for the solution
- Includes an overview of the rest of the document

System services chapter

- Dedicated to the definition of system services - what the system must accomplish
- Likely to account for more than half of the entire document
- Contains high-level requirements business models
  - Context diagram (the system scope)
  - Business use case diagram (function requirements)
  - Business class diagram (data requirements)
System constraints chapter

- Dedicated to the definition of system constraints - how the system is constrained when accomplishing services with regard to
  - Interface requirements
  - Performance requirements
  - Security requirements
  - Operational requirements
  - Political and legal requirements
  - Other constraints
    - Usability
    - Maintainability

Project matters chapter

- Open issues
  - Future requirements
  - Current requirements to be implemented in the future – enhancements
  - Potential problems once when the system deployed

- Preliminary schedule
  - Human and other resources
  - Planning charts (PERT, Gantt)

- Preliminary budget
  - Project cost – range rather than figure
Appendices chapter

- Glossary
  - Terms
  - Acronyms
  - Abbreviations

- Documents and forms
  - Examples of completed (filled in) forms

- References
  - To books and other published sources
  - Meetings’ minutes, memoranda, internal documents

Summary

- **Requirements determination** is about discovering requirements and documenting them
- Two lines of discovery – the discovery from the **domain knowledge** and from the **use cases**
- **Methods of requirements elicitation** include interviewing customers and domain experts, questionnaires, observation, study of documents and software systems, prototyping, JAD and RAD
- **Requirements negotiation and validation** to resolve overlaps and conflicts
- Requirements have to be **managed**
- **Requirements business model** uses diagrams – Context Diagram, Business Use Case Diagram, and Business Class Diagram
- The resulting document is called the **Requirements Document**