Chapter 3
Requirements Determination

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

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

Traditional methods of requirements elicitation
- Interviewing customers and domain experts
- Questionnaires
- Observation
- Study of documents and software systems
Questionnaires
- In addition to interviews
- Close-ended questions
  - Multiple-choice questions
  - Rating questions
  - Ranking questions

Modern methods of requirements elicitation
- Prototyping
- Joint Application Development (JAD)
- Rapid Application Development (RAD)

Observation
- Passive
- Active
  - Carried for a prolonged period of time
  - People tend to behave differently

Prototyping
- Throw-away prototype
- Evolutionary prototype

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

JAD
- The membership
  - Leader
  - Scribe
  - Customers
    - Users
    - Managers
  - Developers
**RAD**
- Evolutionary prototyping
- CASE tools
- Specialists with Advanced Tools (SWAT)
- Interactive JAD
- Timeboxing

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

**Requirements dependency matrix**

<table>
<thead>
<tr>
<th>Requirement</th>
<th>R1</th>
<th>R2</th>
<th>R3</th>
<th>R4</th>
</tr>
</thead>
<tbody>
<tr>
<td>R1</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>R2</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>R3</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>R4</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>

**Requirements risks**
- Technical
- Performance
- Database integrity
- Development process
- Political
- Legal
- Volatility

**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

Business class model

- Campaign
- CallScheduled
- Supporter
- CampaignTicket
- CallOutcome
- Telemarketer

System scope model

- Campaign Database
- Conversation
- Supporter
- Ticket Placement
- Telemarketing
- Ticket Order
- Order Processing
- Supporter Details

Requirements document

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 Functional 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 Environmental Requirements
   3.6 Other Requirements

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

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

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

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**