

**Winter Term 2016**

# **Requirements Engineering and Specification**

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# Audience Survey - I

Your role in the requirements process?

- Sales & marketing
- Engineering
- Executive
- Research & development
- End user

# Audience Survey - II

Which play a part in your organization?

- Prose documents
- Requirements specification tools
- Prototyping
- Business case analysis
- Stakeholder win-win concepts

# Audience Survey - III

Your major concerns with your organization's requirements approach?

- Takes too long to do well
- Too many defects
- Too hard to keep up with change
- Key stakeholders excluded
- Too bureaucratic

# Requirements: Some Examples

- The system shall maintain records of all library materials including books, serials, newspapers and magazines, video and audio tapes, reports, collections of transparencies, computer disks and CD-ROMs.
- The system shall allow users to search for an item by title, author, or by ISBN.
- The system's user interface shall be implemented using a World-Wide-Web browser.
- The system shall support at least 20 transactions per second.
- The system facilities which are available to public users shall be demonstrable in 10 minutes or less.

# Purpose of requirements

**Requirements define what the system is expected to do and the constraints under which it is required to operate**

- Define the system's functionality
- State constraints on how the system must be implemented
- Specify a minimum acceptable performance for the system
- Specify the maximum acceptable time to demonstrate the use of the system

# Typical Requirements Related Problems

- **Misunderstandings** between customers, requirements analysts, and software engineers developing or maintaining the system
- Requirements **not reflecting the real needs** of the customer(s)
- **Inconsistent, incomplete, and/or incorrect** requirements
- **Keeping** requirements **up-to-date** after they have been agreed

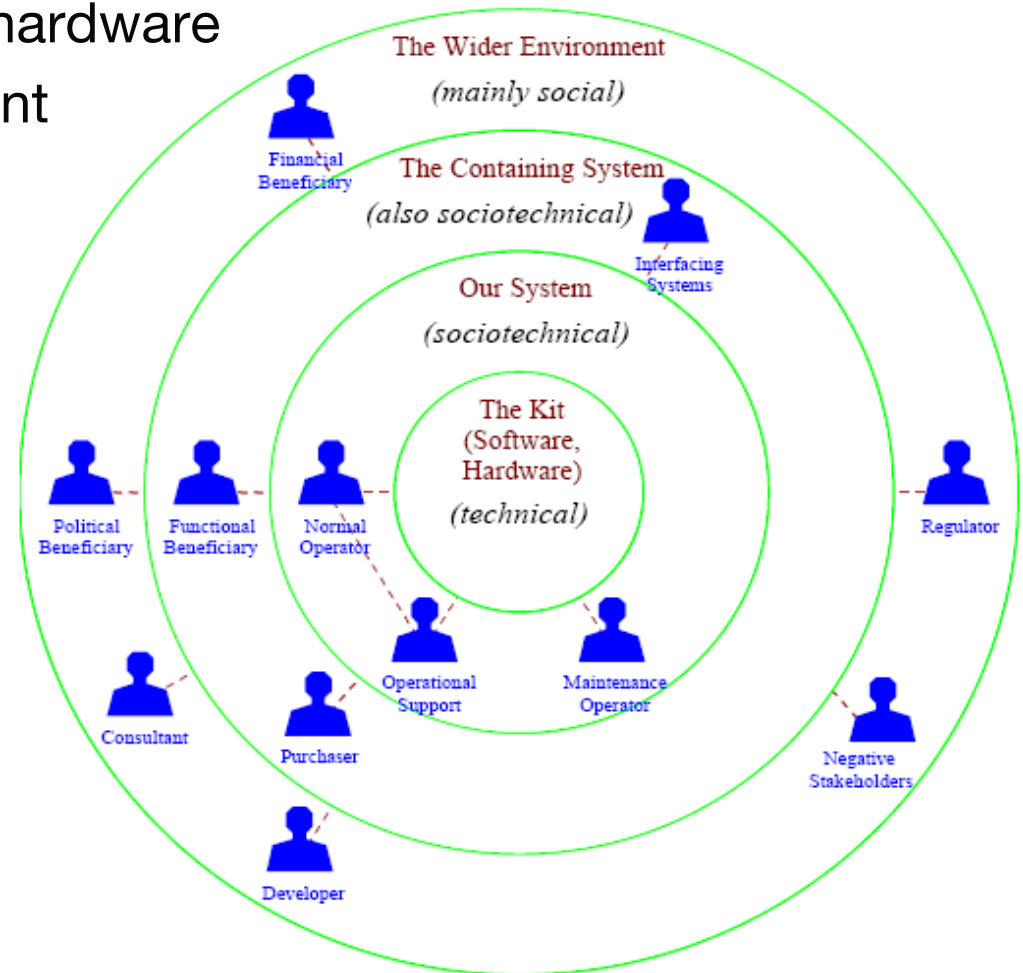
# Where do Requirements Come From?

“A **stakeholder** is someone who has a justifiable claim to be allowed to influence the requirements”

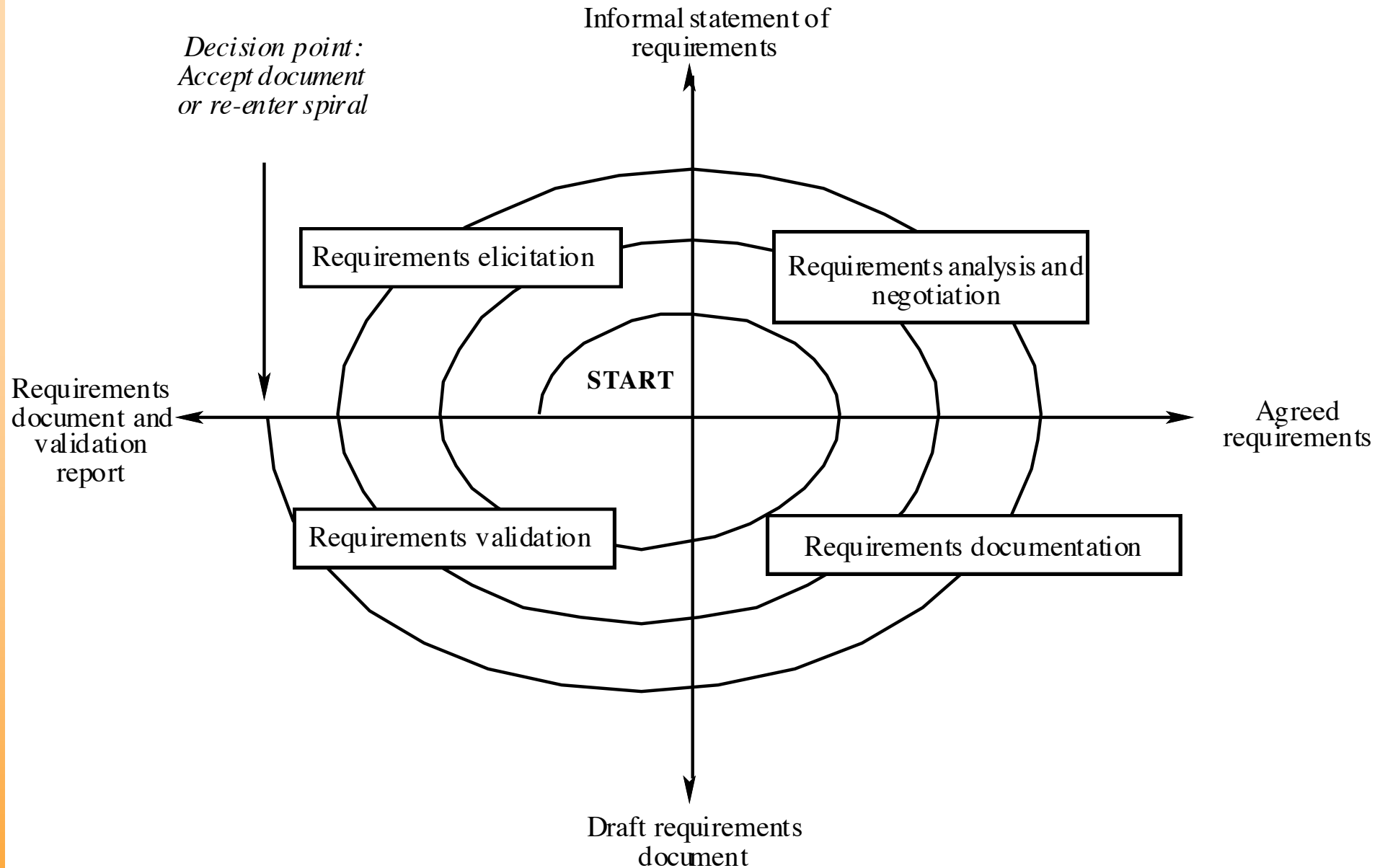
- **users** of the system und development
- **people** whose lives are **affected by the system**, such as clients and suppliers;
- **managers** who are **concerned for the system to succeed**, although they do not use it as such;
- **regulators** such as local and state governments and standards bodies, which are **concerned about the effects** the system may have **in its environment.**”

# The Onion Model

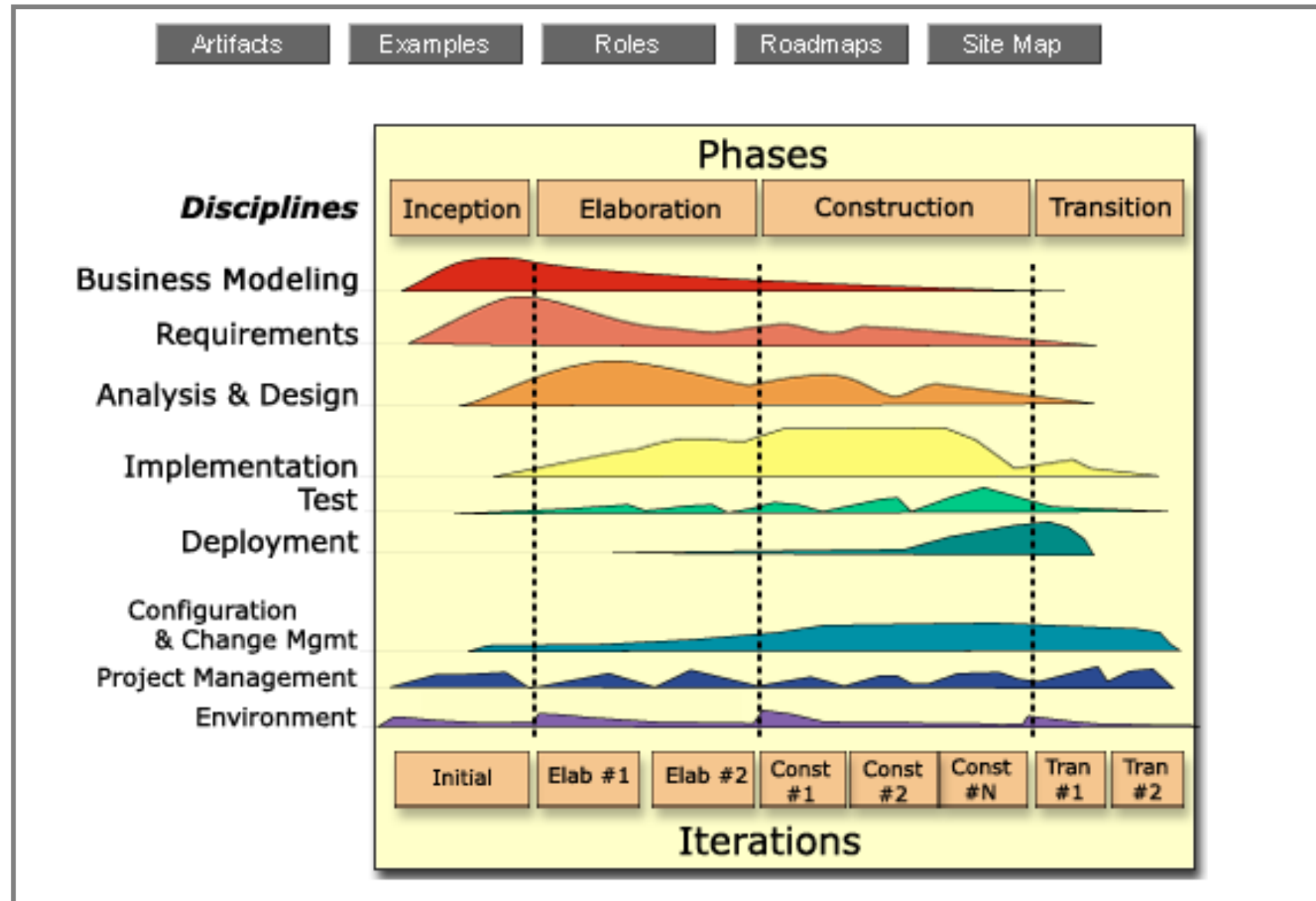
- 1. The Kit (or The Product):** the hardware and software under development
- 2. Our System:** The Kit plus its human Operators and the rules governing its operation
- 3. The Containing System:** Our System plus any human Beneficiaries of Our System (whether they are involved in operations or not)
- 4. The Wider Environment:** The Containing System plus any other Stakeholders



# Requirements Engineering Process



# Requirements In Iterative Life Cycle Models



# Requirements specification

**A formal document used to communicate the requirements to customers, engineers and managers.**

- The services and functions the system should provide
- The constraints under which the system must operate
- Overall properties of the system, i.e., constraints on the system's emergent properties
- Definitions of other systems the system must integrate with

# Getting it right is hard ...



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# Users of requirements documents

## System customers

Specify requirements and check if they meet their needs

## Project managers

Use the requirements document to plan a bid for system or to plan the system development process

## System engineers

Use the requirements to understand the system being developed

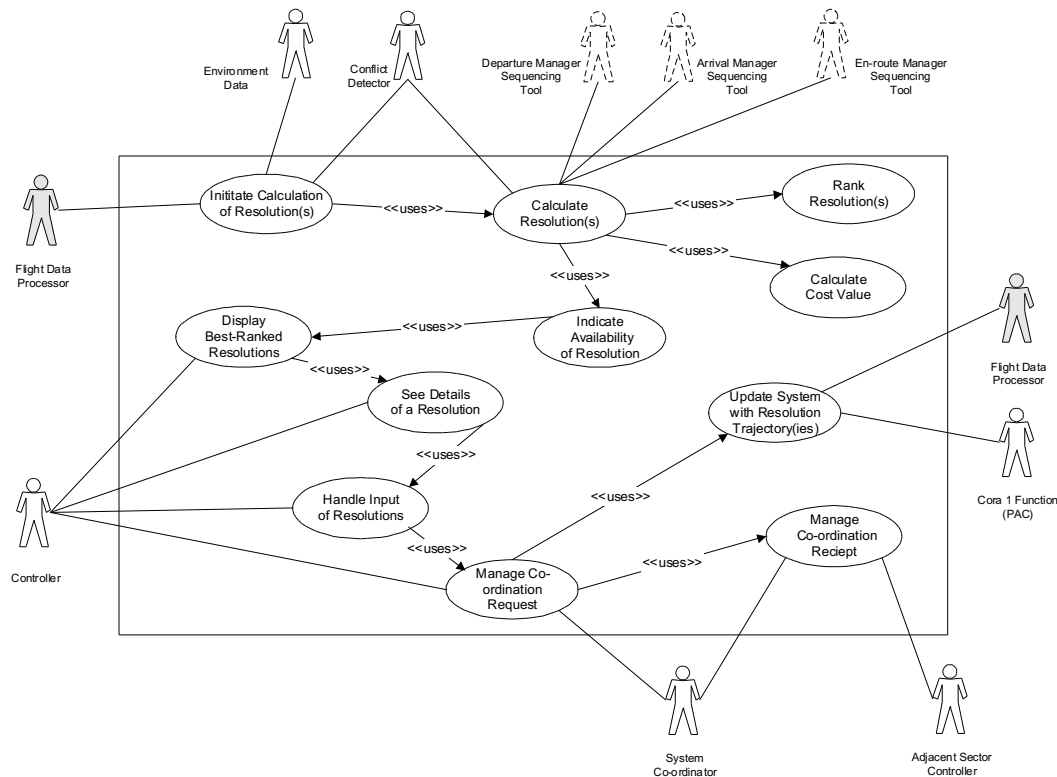
## System test engineers

Use the requirements to develop validation tests for the system

## System maintenance engineers

Use the requirements to help understand the system

# Common Notations



SEARCH AND REPLACE

A user realizes he mis-capitalized a word everywhere in his document, so he tells the word processor to search for all occurrences of it and replace them with the corrected word.

Attribut	Kommentar	Beispiel
Identifikation	Eindeutiger Bezeichner	1.2.5
Typ	Element aus der Anforderungstaxonomie	Erlebnbarkeit
Beschreibung	Kurze natürlichsprachliche Erklärung	Web-Anwendung X soll von gelegentlichen Web-Benutzern ohne zusätzliche Schulung benutzt werden können.
Begründung	Erläuterung, warum die Anforderung wichtig ist	Rund 40% der erwarteten Kunden sind gelegentliche Web-Benutzer.
Quelle	Ansprechpartner bzw. Verweis auf existierende Dokumente	Marketing-Leiterin
Abnahmekriterium	Eine messbare Bedingung, deren Erfüllung als Abnahme gilt	90% der Mitglieder einer zufällig ausgewählten Testgruppe gelegentlicher Web-Benutzer können die Anwendungsfälle Use Case 2.3, Use Case 2.6, Use Case 2.9 und Use Case 2.11 ohne vorhergehende Schulung anwenden.
Priorität	Angabe der Wichtigkeit und der Realisierbarkeit	sehr wichtig; schwierig zu realisieren
Abhängige Anforderungen	Alle von dieser Anforderung abhängigen Anforderungen	1.2.7, 2.3.4, 2.3.6
Konfliktäre Anforderungen	Alle mit dieser Anforderung in Widerspruch stehenden Anforderungen	4.5.6
Weiterführende Informationen	Verweise auf weiterführende Informationen	Usability Guidelines v1.2
Version	Erfassung der Entstehungsgeschichte	1.06

# FAQs about requirements

- What are requirements?
  - A statement of a system service or constraint
- What is requirements engineering?
  - The processes involved in developing system requirements
- How much does requirements engineering cost?
  - About 15% of system development costs
- What is a requirements engineering process?
  - The structured set of activities involved in developing system requirements

## FAQs cont'd.

- What happens when the requirements are wrong?
  - Systems are late, unreliable and don't meet customers needs
- Is there an ideal RE process?
  - No, processes must be tailored to organisational needs
- What is a requirements document?
  - The formal statement of the system requirements
- What are system stakeholders?
  - Anyone affected in some way by the system

## FAQs contd.

- What is the relationship between requirements and design?
  - Requirements and design are interleaved.
  - They should, ideally, be separate processes but in practice this is impossible
- What is requirements management?
  - The processes involved in managing changes to requirements

# Literature

- Pohl, K.: Requirements Engineering. Fundamentals, Principles, and Techniques, Springer 2010.
- Robertson, S.; Robertson, J.: Mastering the Requirements Process: Getting Requirements Right, Addison-Wesley Professional, 2013.
- Sommerville, I.; Kotonya, G.: Requirements Engineering: Processes and Techniques. John Wiley & Sons, Inc., New York, 1998.
- Sutcliffe, A.: User-Centered Requirements Engineering: Theory and Practice. Springer, New York, Inc., Secaucus, 2002.

# Dates and Times

1 - **Overview and Introduction, Elicitation and Negotiation** (October 13, 12:00-15:00, Hörsaal 6)

2 - **Use Cases & Scenarios** (November 3, 11:00-14:00, Hörsaal 6)

3 - **Requirements Specification** (November 17, 13:00-16:00, Informatikhörsaal)

4 - **Quality Requirements / Requirements and Architectures** (December 1, 11:00-14:00, Hörsaal 6)

5 - **Product Lines and Requirements** (December 15, 11:00-14:00, Hörsaal 6)

6 - **Software Product Management** (January 19, 12:00-15:00, HS 13 Ernst Melan)

Exam TBA