

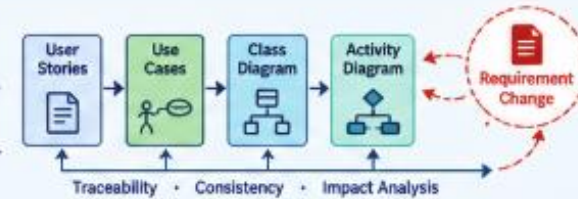
Engenharia de Software (14341, 16230, 15386)

L05: Model-Driven Requirements Engineering

L05

Practical Lab #5 Model-Driven Requirements Engineering Managing Traceability, Consistency and Change

Trace
Understand
Adapt
Deliver Better
Software



Today's Competency Readiness Indicators

By the end of this lab, you will be better able to:



Analyse requirement changes

Evaluate how modifications in requirements affect the system and project scope.



Maintain traceability between artefacts

Link user stories, use cases, class diagrams and other requirements artefacts through explicit traceability relationships.



Perform impact analysis

Identify which models, documents and components must be updated when a requirement changes.



Ensure consistency across models

Verify that requirements, use cases and class diagrams remain aligned and free of conflicts.



Synchronize multiple requirements models

Understand how changes propagate across interconnected models and keep them synchronized.



Support evidence-based design decisions

Justify modelling updates based on traceability and impact analysis, considering project goals and stakeholder needs.

Related SFIA Competencies (main areas)

REQM

Requirements Definition and Management

DESN

Systems Design

MODL

Systems Modelling

ANAL

Business Analysis

L05 – MODEL-DRIVEN REQUIREMENTS ENGINEERING

Goal: Ensure consistency and traceability across requirements models and understand how changes propagate.

PROJECT MILESTONES

1 Requirements Engineering

- ☒ Stakeholders
- ☒ Features
- ☒ Personas
- ☒ Scenarios
- ☒ User Stories

2 Requirements Analysis

- ☒ Use Case Specifications
- ☒ Use Case Diagram
- ☒ Class Diagram (Domain Model)

3 Dynamic Modelling

- ☐ Sequence Diagram
- ☐ Activity Diagram
- ☐ State Diagram

4 Software Design

- ☐ Software Architecture
- ☐ Design Decisions

Legend

- ☒ Completed milestone
- ☐ Pending milestone

TODAY'S SPRINT GOAL

Analyse the impact of a change request across all requirements models, ensure consistency and traceability, and update the artefacts when necessary.

PART 1 Project Brief

10 min ⌚

CLIENT CHANGE REQUEST #1



"Students should now be able to receive a notification 10 minutes before the start of a booked study room reservation."

This new requirement may impact several artefacts in your models.

Your task:

Analyse the change and plan the necessary updates.

Think about:

- What is the new behaviour?
- Which actors or entities are involved?
- What information is affected?
- What artefacts must be updated?

TODAY'S DELIVERABLES

- Change Impact Analysis Report
- Updated artefacts (if needed)
- Traceability Matrix (updated)



PART 2 Core Project

60 min ⌚

Review the current artefacts from your project for the affected functionality (Study Room Reservation).

1 Review User Stories

Identify the stories related to the change and decide what needs to be added or updated.

2 Review Use Case Specifications

Analyse the description and identify what must be updated or extended.

3 Review Use Case Diagram

Check if new use cases, actors or relationships are required.

4 Review Class Diagram (Domain Model)

Identify new classes, attributes or associations that may be needed.

DELIVERABLE

Change Impact Analysis Report
+ Updated artefacts (if needed)

PART 3 Engineering Challenge

25 min ⌚

CHANGE IMPACT ANALYSIS

Analyse the client change request and answer the following:

- 1 Which existing artefacts are affected?
- 2 Which artefacts remain unchanged?
- 3 Which new artefacts (if any) are required?
- 4 What changes would you make and why?

Fill in the impact table:

Artefact	Update?	Why / What changes?
User Story	☒	---
Use Case Specification	☒	---
Use Case Diagram	☐	---
Class Diagram (Domain Model)	☒	---

Identify any new information or entities needed to support the change.

DELIVERABLE

Change Impact Analysis Report

PART 4 AI Challenge

20 min ⌚

Use an LLM (e.g., ChatGPT) to help you analyse the impact of the change.

SUGGESTED PROMPT

We have a Smart Campus system. New requirement: "Students should receive a notification 10 minutes before the start of a booked study room reservation."

Given the following artefacts (User Stories, Use Case Specs, Use Case Diagram, Class Diagram), which artefacts are affected? What changes are needed? What new artefacts or information are required? Explain why.

[Attach or paste artefacts here]



Evaluate the AI suggestions critically.

- ☒ Did the AI identify the correct impacts?
- ☒ Are any changes missing?
- ☒ Are the proposed solutions feasible?
- ☒ What would you do differently?

PART 5

Reflection & Discussion

15 min ⌚

Share and discuss with the class.

Which artefact was most affected by the change? Why?

What new information or entities were needed?

How does a change in requirements propagate across the models?

How does traceability help us maintain consistency when requirements evolve?

ENGINEERING INSIGHT

Changes in requirements rarely affect only one artefact. Consistent models and good traceability ensure quality, reduce rework and support future evolution.

TIPS FOR SUCCESS

- Understand the change before updating.
- Analyse the impact on each artefact.
- Keep models consistent and synchronized.
- Update only what is necessary.
- Maintain your traceability matrix.

TRACEABILITY EXAMPLE (UPDATED)

				
User Story 1	☒	☒	☒	☒
User Story 2	☒	☒	☒	☒
User Story 3	☒	☒	☒	☒
User Story 4 (NEW)	☒	☒	☒	☒

✓ = related / traced

TOOLS YOU CAN USE

-  diagrams.net (draw.io)
-  Lucidchart
-  Visual Paradigm Online
-  miro

QUESTIONS?

Let's clarify, explore and learn together!



Concepts

Anything you didn't understand?



Applications

How do we apply these ideas?



Decisions

Want to discuss any trade-offs?



Next Steps

What would you like to learn next?



No question is too small!

Your questions help everyone learn and grow.



Ask freely, challenge ideas, and let's build understanding **together!**