

# Introduction to Second Semester Project



# Semester project: Development of Software Systems, (F24)

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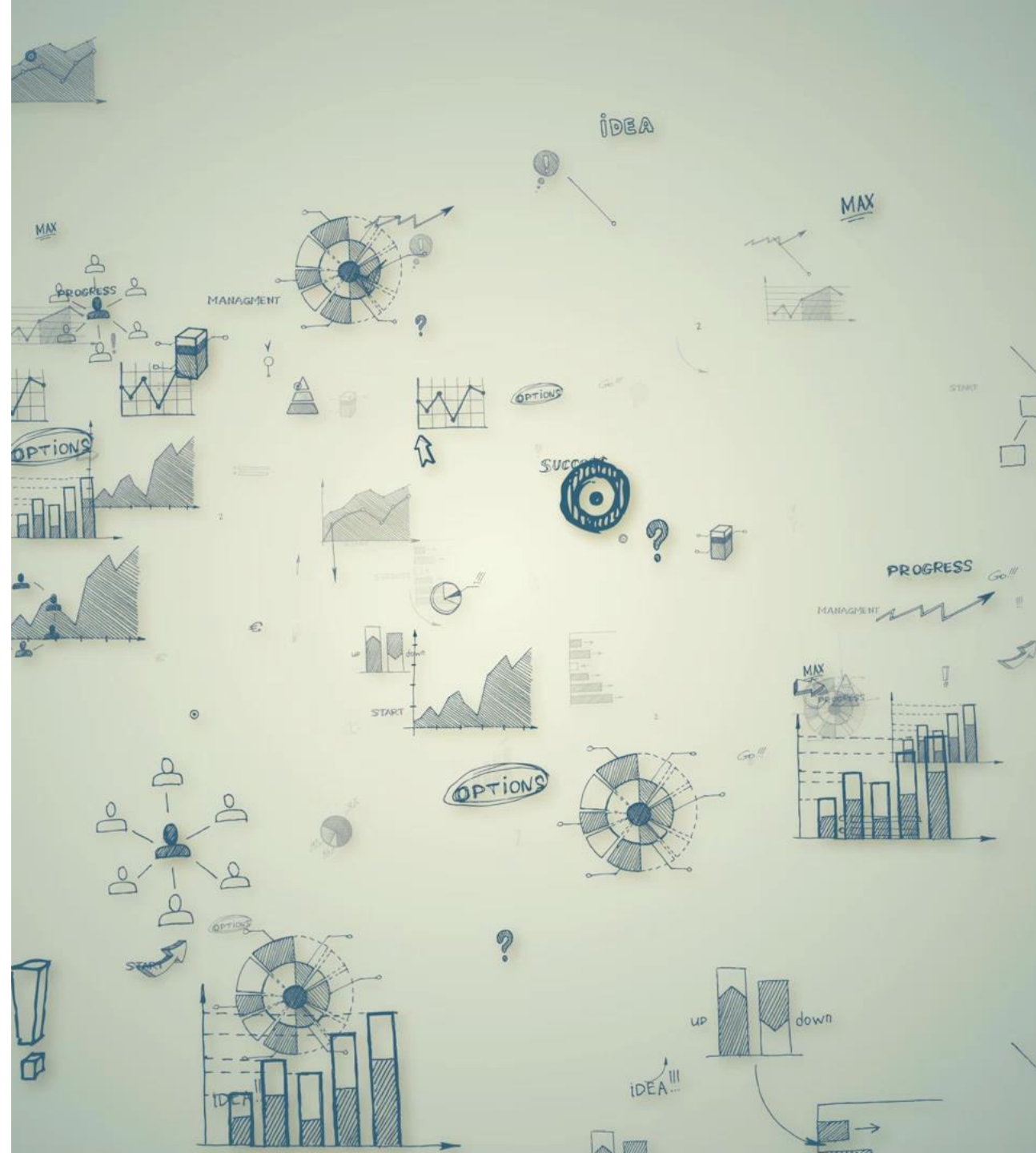
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# Overview

- ✓ Semester Project
- ✓ Problem-oriented project work
- ✓ Group formation
- ✓ Activity plan
- ✓ Sprints and hand-ins
- ✓ Project submission and report



# Second Semester

## BSc in Software Engineering

2

5 ECTS	10 ECTS	5 ECTS	10 ECTS
Mathematics 2	Software Engineering	Advanced Object-Oriented	Semesterproject: Development of Software Systems

# Semester Supervisors



Mubashrah Sadiqa



Guarav Choudhary



Serkan Ayvaz



Sadok Ben Yahia





# Semester Project Learning Objectives

## **(Software Engineering and Organization)**

- organize and carry out the development of a software application using agile methods

## **(Advanced Object-Oriented Programming)**

- program a software application using an object-oriented language

## **(Engineering basics and practice)**

- collaborate with other colleagues and perform individual work
- plan and manage the project workload and assume responsibility towards the delivery of the product
- use selected support techniques and tools for the project work and for communicating the project results
- write clear, precise, and accurate technical documentation that follows well-defined standards regarding format and includes relevant tables, figures, and references
- review technical documentation
- express themselves in writing about their own and others' efforts during the project
- argue and evaluate good and bad practices during the project

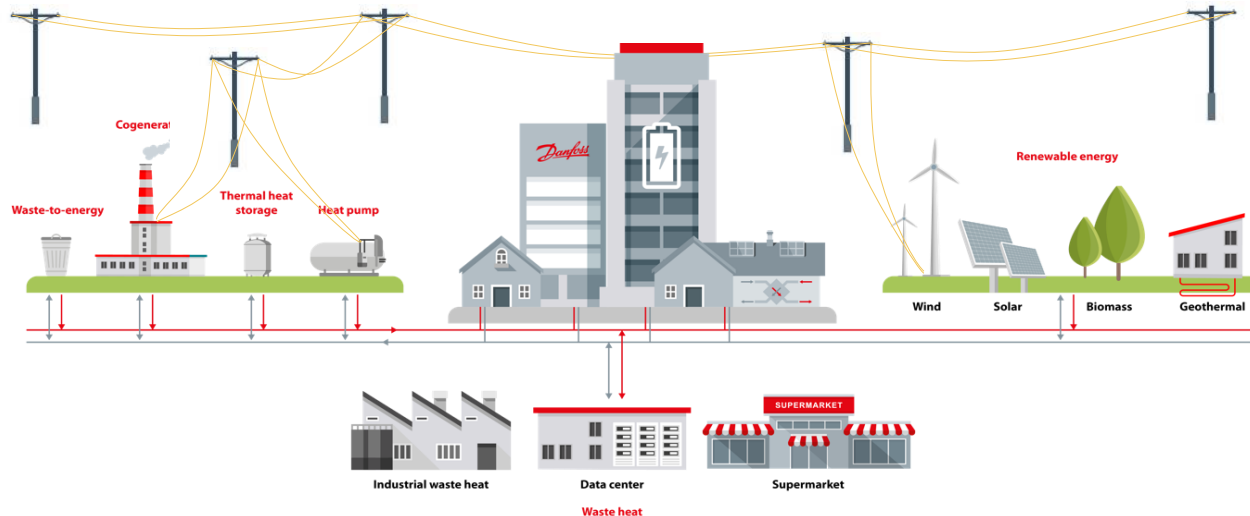
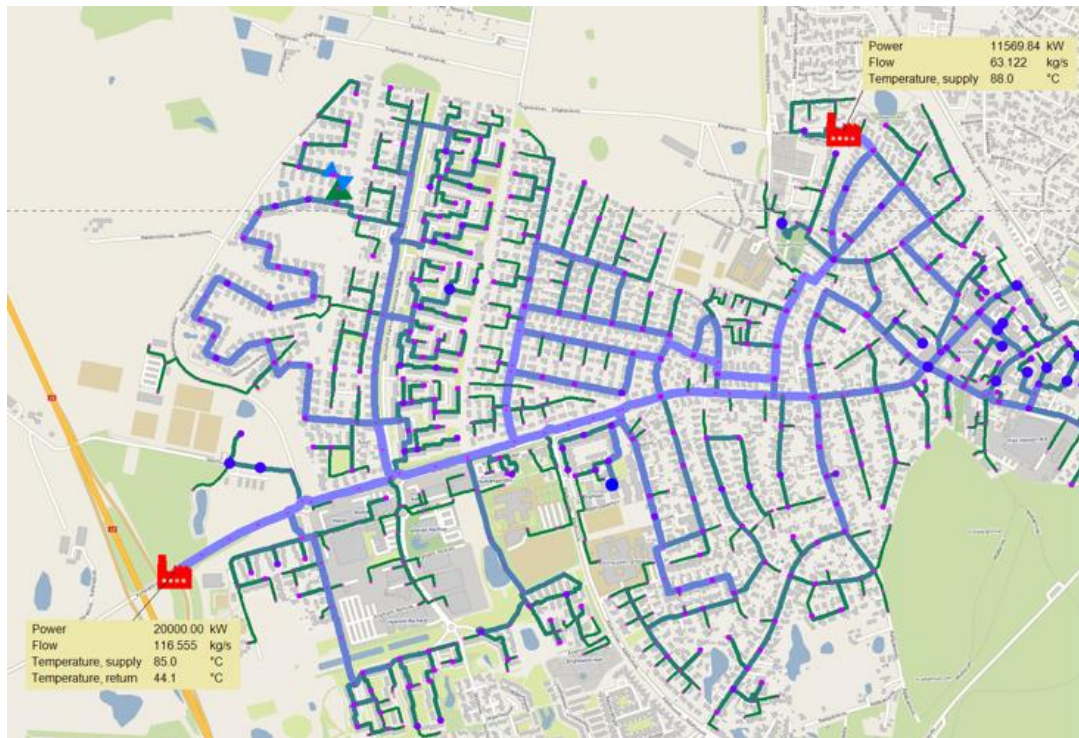
## **(DSMI)**

- evaluate their own learning and familiarize themselves with new knowledge independently

# Semester Project

## Heat Production Optimization

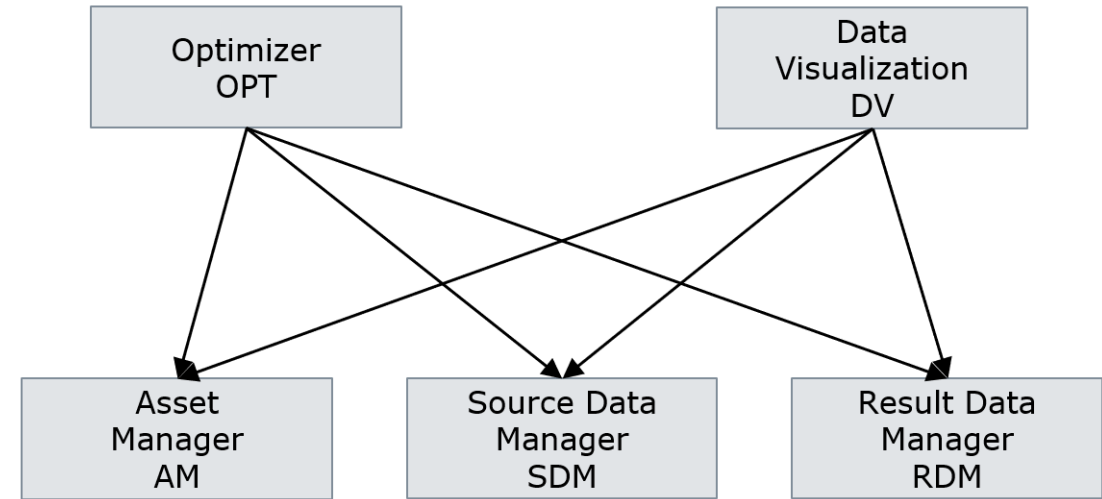
HeatItOn is the utility in the city of Heatington which has to secure the heat delivery to approx. 1600 buildings through a single district heating network. They produce heat with a number of traditional heat-only boilers as well as units that combine the production of heat with the production / consumption of electricity (CHPs). They are planning the heat schedules manually but now they want to cost optimize their production





# Semester Project

1. Students will work in groups to develop a software application based on a business case. The application is developed in .NET using object-oriented principles. The project is carried out using agile methods.
2. The goal of the project is to define heat schedules for all available production units with the lowest possible expenses and the highest profit on the electricity market.
3. The provided data should be explored as part of the problem analysis. The delivered source code must as a minimum develop the modules: Asset Manager, Source Data Manager and Result Data Manager and further implement either the Optimizer or the Data Visualization. Ideal solution should contain all modules.





# Project Work

## Problem-oriented project work

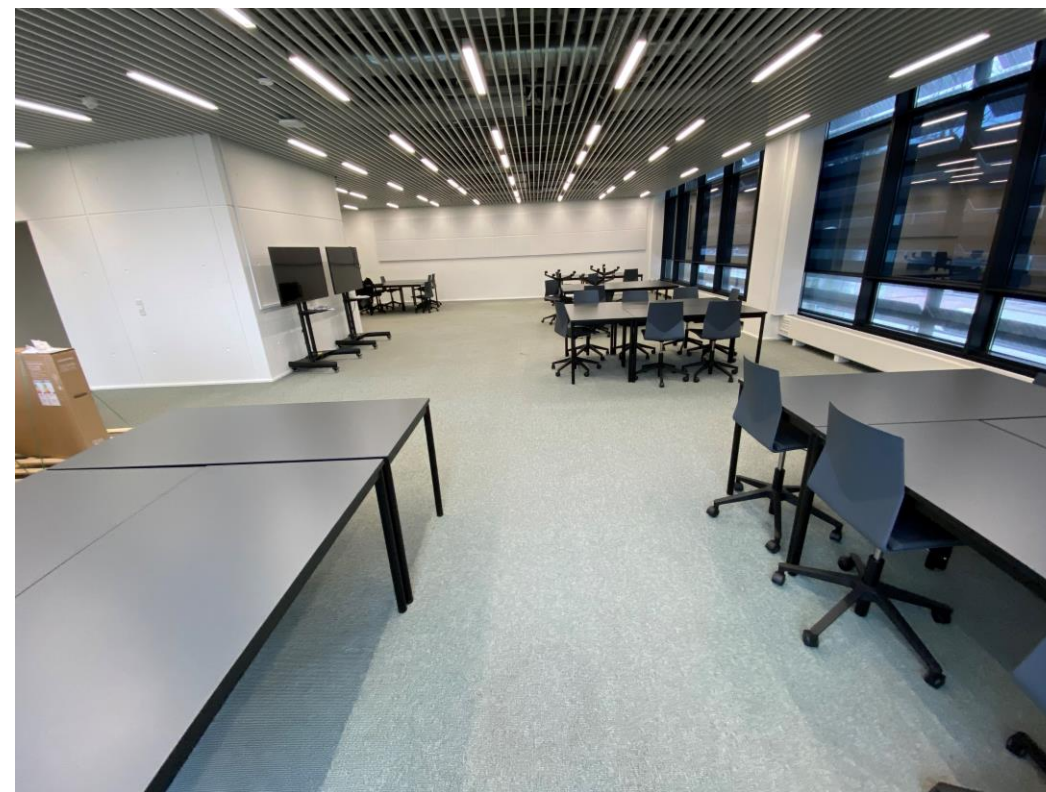
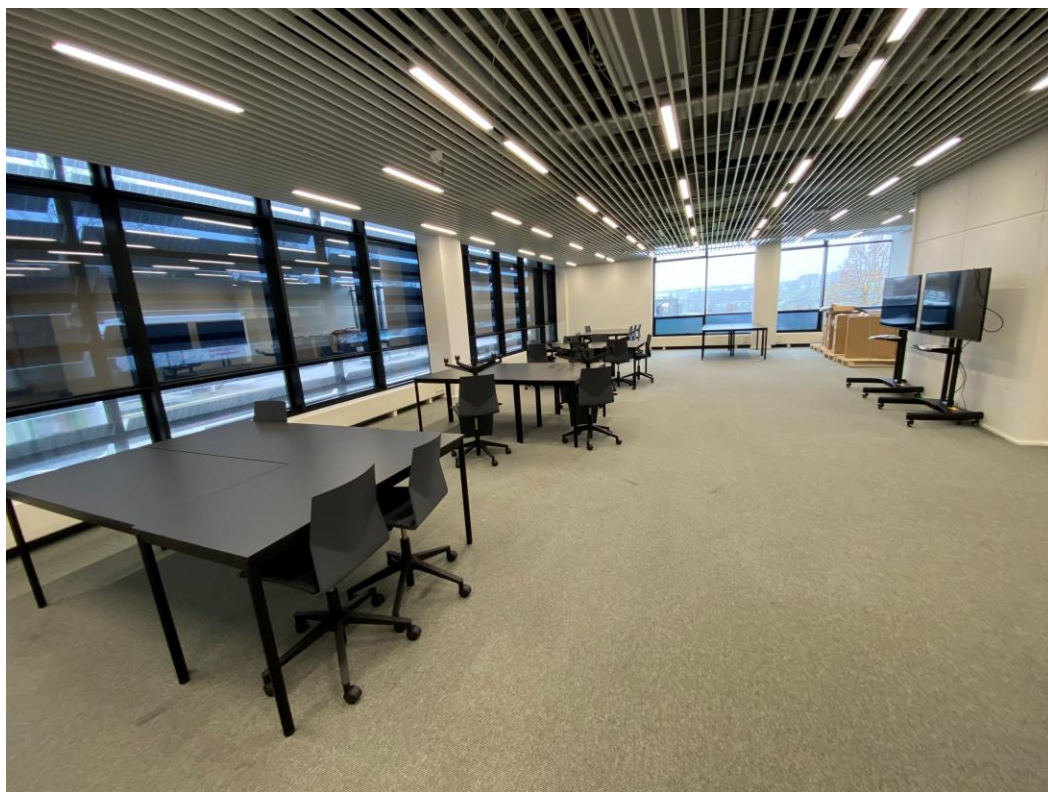
The project work is problem-oriented, which means that it is guided by a problem that the project groups themselves choose and formulates within the framework provided by the project case.



# Project Groups

- You can choose your group in Itslearning.
- A group can have a maximum of 6 students
- Total 16 groups with 16 group with 6 group members.

# Group Study Rooms





# Project Activities

Week	Activity	Description	Date	Semester Team
Project Kickoff Meetings(Weeks 6-7)				
6	Project	Project kick-off meeting with Danfoss	06-02-2024	Semester coordinator, Supervisors and Danfoss Employees
7	Semester	General meeting: Introduction to semester, semester project, Group Formation	13-02-2024	Semester coordinator

# Project Activities

Project Workshops (Weeks 7-8)				
7	Semester	<b>Workshop 1-Jira intro</b>	15-02-2024	Henrik Lange
8	Semester	<b>Workshop 2-Scrum intro</b>	20-02-2024	Michael Hansen
8	Semester	<b>Workshop 3-Jira exercises</b>	23-02-2024	Henrik Lange

# Project Activities

Project Planning (Weeks 9-10)				
9	Project	<b>Guidance Seminar in the Classes:</b> Project planning and collaboration	27-02-24	Respective Supervisors
10	Project	<b>Project Requirements Submission:</b> Release Planning	05-03-24	Respective Supervisors



# Project Activities

Project Sprints (Weeks 10-21)				
10	Sprint 1	<b>Sprint 1 begins:</b> Sprint Planning	05-03-24	Respective Supervisors
11	Sprint 1	<b>Sprint 1 Checkpoint:</b> Daily Scrum	12-03-24	Respective Supervisors
12	Sprint 2	Sprint 1 Review and Retrospective <b>Sprint 2 begins:</b> Sprint Planning	19-03-24	Respective Supervisors
14	Sprint 2	<b>Sprint 2 Checkpoint:</b> Daily Scrum	02-04-24	Respective Supervisors
15	Sprint 3	Sprint 2 Review and Retrospective <b>Sprint 3 begins:</b> Sprint Planning	09-04-24	Respective Supervisors

# Project Activities

16	Semester	<b>Midterm Evaluation all groups:</b> Midterm Evaluation of Semester and Project by Semester Coordinator (Group Representative Meeting)		Semester coordinator
16	Sprint 3	<b>Sprint 3 Checkpoint:</b> Daily Scrum	16-04-24	Respective Supervisors
17	Project	<b>Midterm Seminar in the Classes:</b> <ul style="list-style-type: none"><li>• Presentation of the Project</li><li>• Submission of Report and Code on itslearning</li></ul>	16-04-24	Respective Supervisors

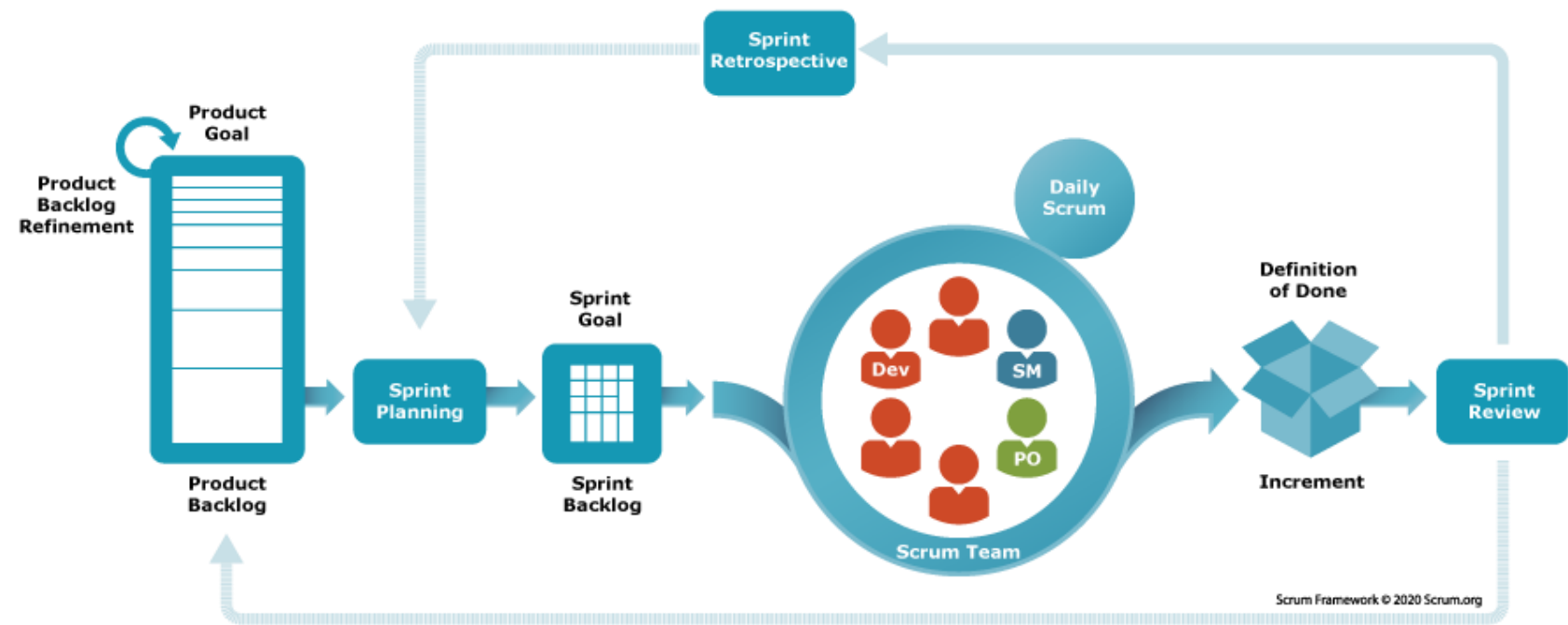
# Project Activities

17	Sprint 4	Sprint 3 Review and Retrospective <b>Sprint 4 begins:</b> Sprint Planning	23-04-24	Respective Supervisors
18	Sprint 4	<b>Sprint 4 Checkpoint:</b> Daily Scrum	30-04-24	Respective Supervisors
19	Sprint 5	Sprint 4 Review and Retrospective <b>Sprint 5 begins:</b> Sprint Planning	07-05-24	Respective Supervisors
20	Sprint 5	<b>Sprint 5 Checkpoint:</b> Daily Scrum	14-05-24	Respective Supervisors
21	Semester	<b>Group Supervisor Meeting Semester General Meeting:</b> Information about Project Submission and Examination by Semester Coordinator		Semester Coordinator



# Project Activities

Submission Phase (Weeks 21-22)				
21	Project	Sprint 5 Review and Retrospective  Final Demo on 21st May	21-05-24	Respective Supervisors and Danfoss Employees
22	Semester	Code Submission	31-05-24	
22	Semester	Submission of report	31-05-24	



# Project Stages

# Planning

Planning and organizing is essential!

Ideas to get started:

- Make a visible overview of the project stages
- Make a work plan and a clear timeline
- Plan project meetings
- Make summaries of each project meeting





# Steps in project work



Step 1: Understand the project

Step 2: Get ideas

Step 3: Decide what to work with in the group

Step 4: Make the group work (roles)

Step 5: Collect knowledge

Step 6: Problem formulation

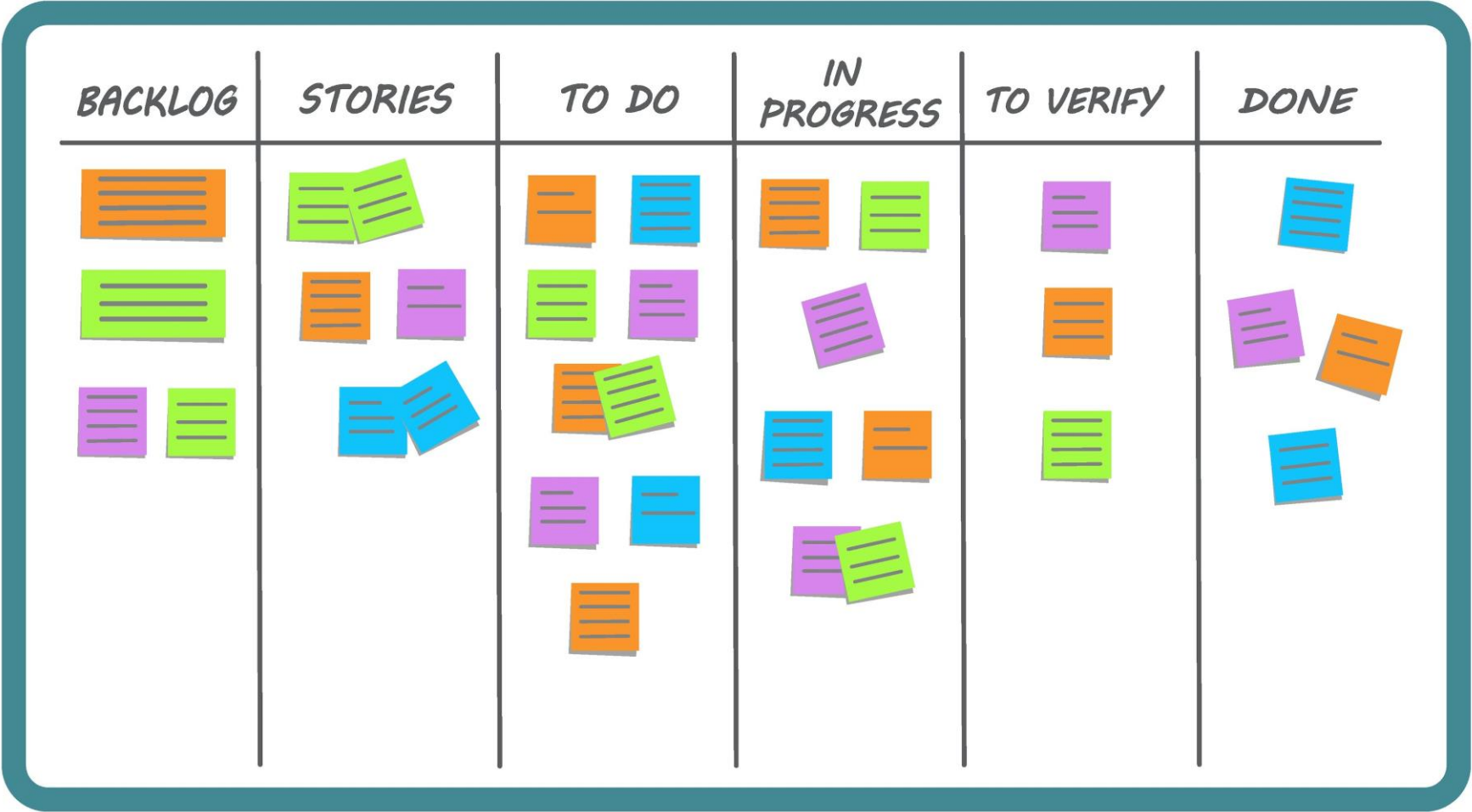
Step 7: Make disposition, workplan & timeline

Step 8: Investigate and execute

Step 9: Conclusions and report

Step 10: Present and evaluate

# Project Planning



# Sprint planning and hand-ins



# Release Planning

You must deliver:

What
<ol style="list-style-type: none"><li>1. Your <b>Product Backlog</b>, i.e., the list of <b>user stories</b> you have written in connection with the requirements specified for your part of the project (using the <b>Connextra template</b>).<ol style="list-style-type: none"><li>a. The Product Backlog must include a <b>prioritization</b> and an <b>estimate (in story points)</b> of the user stories.</li></ol></li></ol>
<ol style="list-style-type: none"><li>2. The “<b>Definition of Done</b>” (DoD) you agreed with your group.</li></ol>



# At the beginning of each Sprint

You must deliver:

What
<p>3. Your <b>Sprint Backlog</b>. It must include:</p> <ul style="list-style-type: none"><li>a. An updated <b>estimate (in story points)</b> of the stories in the Product Backlog,</li><li>b. The list of <b>user stories</b> that will be implemented during the Sprint (using the <b>Connextra template</b>),</li><li>c. For each user story, the <b>acceptance criteria</b></li><li>d. For each user story, the list of <b>tasks</b> with an <b>estimate in hours</b>,</li><li>e. The updated team <b>Velocity</b>.</li></ul>
<p>4. Your startup <b>Scrum Board</b>.</p>

# Daily Scrum

In the middle of each Sprint (at the end of each Daily Scrum), you must deliver:

What
5. Your <b>Daily Scrum</b> report.
6. Your mid-Sprint <b>Scrum Board</b> .
7. Your mid-Sprint <b>Burndown Chart</b> .

# Sprint Review

At the end of each Sprint, you must deliver:

What
8. Your <b>Sprint Review</b> report.
9. The <b>UML diagrams</b> (if any) developed during the Sprint.
10. Your final <b>Scrum Board</b> .
11. Your final <b>Burndown Chart</b> .
12. The list of all pull requests made during the Sprint to the common Gitlab repository.

# Sprint Retrospective:

At the end of each Sprint, you must deliver:

What
13. Your <b>Sprint Retrospective</b> report.

What	Deadline
<b>Release Planning</b> package	05/03, 23:59
Sprint 1 – <b>Sprint Planning</b> package	-
Sprint 1 – <b>Daily Scrum</b> package	-
Sprint 1 – <b>Sprint Review and Retrospective</b> packages	19/03, 23:59
Sprint 2 – <b>Sprint Planning</b> package	19/03, 23:59
Sprint 2 – <b>Daily Scrum</b> package	02/04, 23:59
Sprint 2 – <b>Sprint Review and Retrospective</b> packages	09/04, 23:59
Sprint 3 – <b>Sprint Planning</b> package	09/04, 23:59
Sprint 3 – <b>Daily Scrum</b> package	16/04, 23:59
Sprint 3 – <b>Sprint Review and Retrospective</b> packages	23/04, 23:59
Sprint 4 – <b>Sprint Planning</b> package	23/04, 23:59
Sprint 4 – <b>Daily Scrum</b> package	30/04, 23:59
Sprint 4 – <b>Sprint Review and Retrospective</b> packages	07/05, 23:59
Sprint 5 – <b>Sprint Planning</b> package	07/05, 23:59
Sprint 5 – <b>Daily Scrum</b> package	14/05, 23:59
Sprint 5 – <b>Sprint Review and Retrospective</b> packages	21/05, 23:59
<b>Final Report and Code Submission</b>	31/05, 23:59

# Schedule of mandatory hand-ins

- All submissions through itslearning except the final report which should be on DigitalExam
- All the material must be in English



# Project final submission and examination

# The Final Report (1/4): Overview

You must deliver a final PDF including the following contents:

- Cover page
- Table of contents (with page numbers)
- Chapter1: Introduction
- Chapter 2: Release Planning
- Chapter 3: Sprints
- Chapter 4: Technical aspects including UMLs and testing
- Chapter 5: Conclusion
- Appendices

# The Final Report (2/4): Overview

## ➤ Chapter 1: Introduction

- An introductory chapter contextualizing the project and the specific module/set of tasks you worked on.

## ➤ Chapter 2: Release Planning

- A second chapter with the material previously handed in for your Release Planning.

## ➤ Chapter 3: Sprints

- A chapter with all the material previously handed in for each Sprint.
  - a. Section 1 for the material of Sprint 1
  - b. Section 2 for the material of Sprint 2
  - c. Section 3 for the material of Sprint 3
  - d. Section 4 for the material of Sprint 4
  - e. Section 5 for the material of Sprint 5

# The Final Report (3/4): Overview

## ➤ Chapter 4: Technical aspects

- A technical aspects presenting:
  - All the **UML diagrams** used in the project and the rationale behind their design (explain what they represent, which aspects of the system they're modeling, and why the group considered they were relevant for explaining these aspects). Remember you must produce at least one of each UML diagram taught in class (i.e., Package, Classes, Activity, Sequence, and State Machine),
  - How **Simple Design** was implemented throughout the project and your reflection on it,
  - How **Incremental Design** was implemented throughout the project and your reflection on it,
  - How **Refactoring** was implemented throughout the project and your reflection on it
  - How **Test-Driven Development** was implemented throughout the project and your reflection on it,
  - How **Unit Testing** was implemented throughout the project and your reflection on it,
  - How **Pair Programming** was implemented throughout the project and your reflection on it,
  - How **Code Review** was implemented throughout the project and your reflection on it.

# The Final Report (4/4): Overview

## ➤ Chapter 5: Conclusion

- A conclusion chapter with the group's reflection on:
  - The project as a whole and its experience while working on a common project with the other groups (what went well, what went not so well).
  - Its experience with the development of the group's specific set of tasks (what went well, what went not so well),
  - The specific contribution of each team member,
  - Potential actions that could be adopted in future projects to avoid the problems and/or difficulties faced by the team during the project.



# The Report Hints



Respect your medium. Assume that your report will be printed and read on paper.



Write concisely and precisely. Nobody wants to read filler content.



Focus on sub-designs. When dealing with complexity where diagrams become unreadable, select interesting parts of the design, and only include relevant properties in the diagrams you choose to include.



Be descriptive and argumentative.

# Examination

## Examination is held

- At the end of the semester
- Oral examination

## Group presentation of your project:

- A group consists of 4-6 students.
- An individual exam cannot be chosen instead of a group exam.
- The basis for the assessment is always individual and individual grades are given.
- The oral examination last 10 minutes per student, i.e., 60 minutes for a group of 6 students, 30 minutes for a group of 3 students, and so on.

# Grades

## **Project (10 ECTS):**

The grade is based on an overall assessment of:

- The project report
- An oral group exam based on the project report.