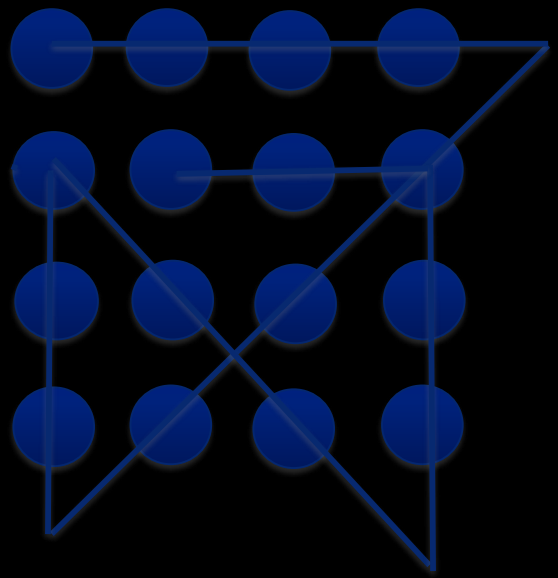
Puzzle

Given 4 rows and 4 columns of dots. Using six contiguous straight lines, connect all of the sixteen dots.



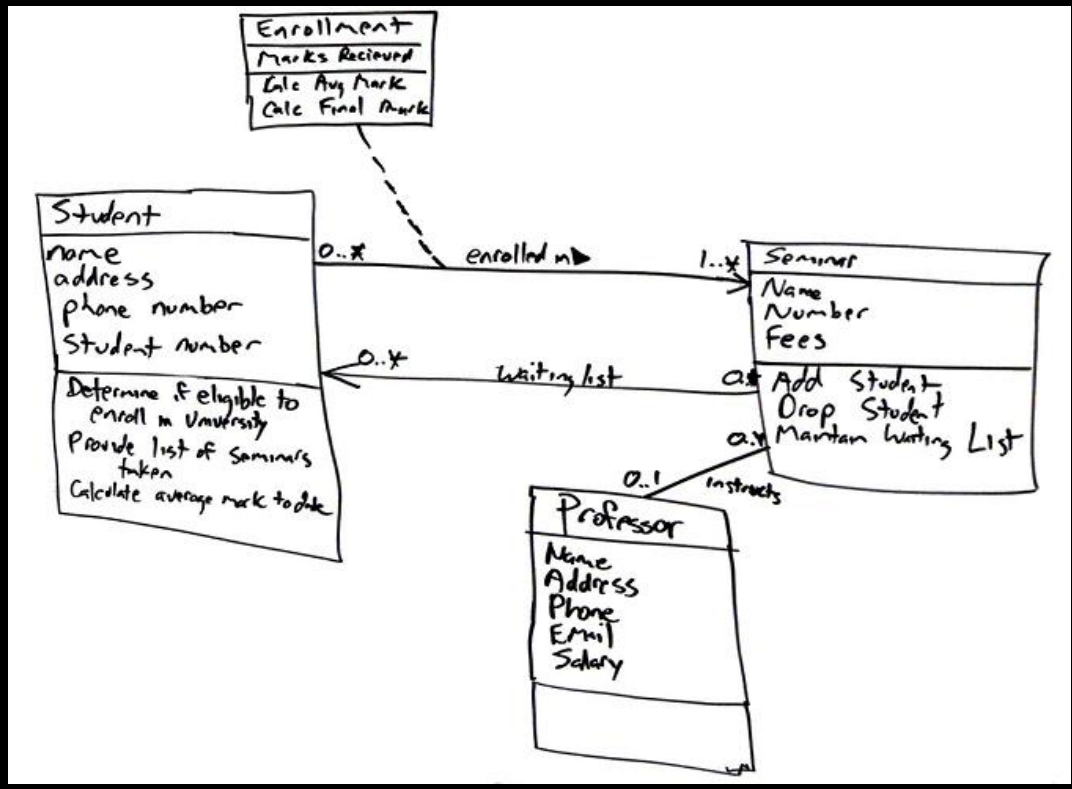
Game

Focus on move!

Domain model

See the relationship, and make new ones.

Try to describe this model in words.



Creativity

Free your mind!

CHALMERS

UNIVERSITY OF GOTHENBURG

Welcome to Model Driven Software Development

Rogardt Heldal/Magnus Ågren
Software Engineering Division
Chalmers & Gothenburg University

From requirements to code

Requirement/top level architecture
- Specification - quite informal

Can use models communications

Working architecture
- Precise structure of the system

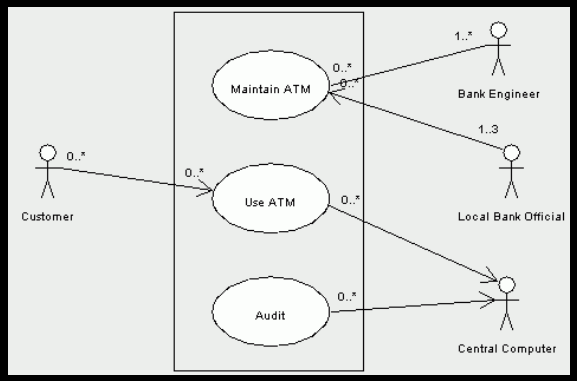
Can use models analysis

Software design
- Behavior

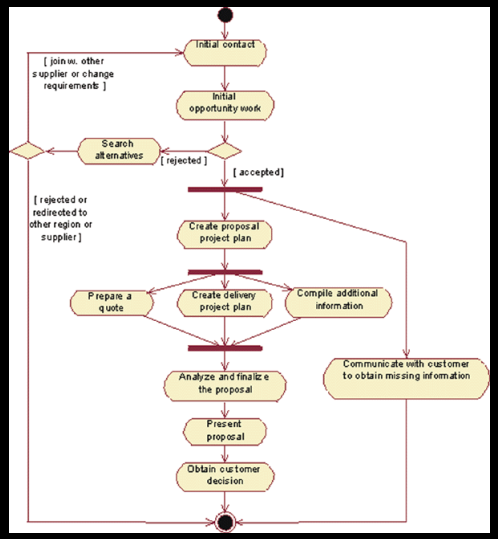
Can use models simulations

Example: Requirement/Analysis

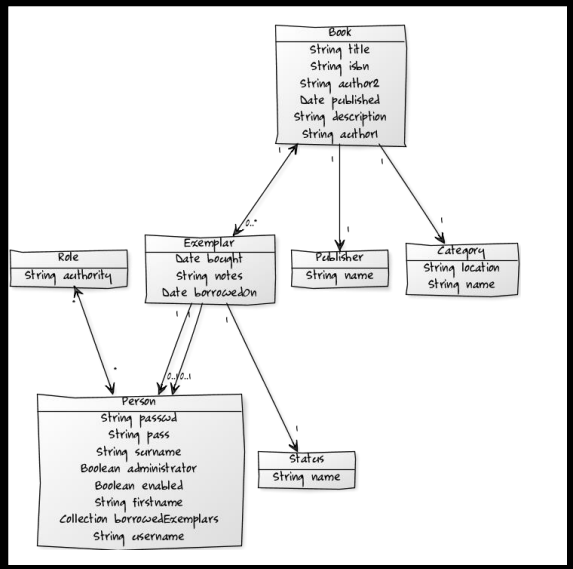
Descriptive Models



Use Cases Diagram



Activity Diagram



Domain Model

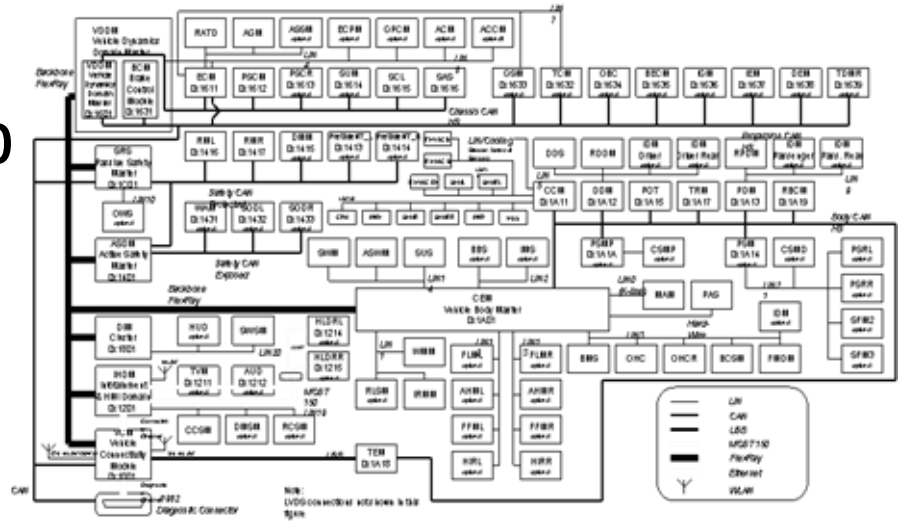
Purpose: understand and describe the system

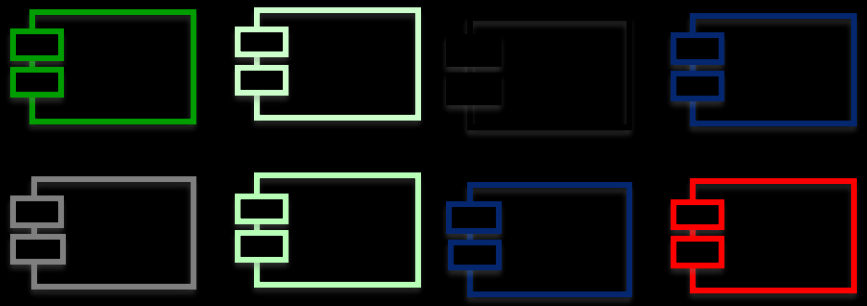
Software architecture
- Precise structure of the system

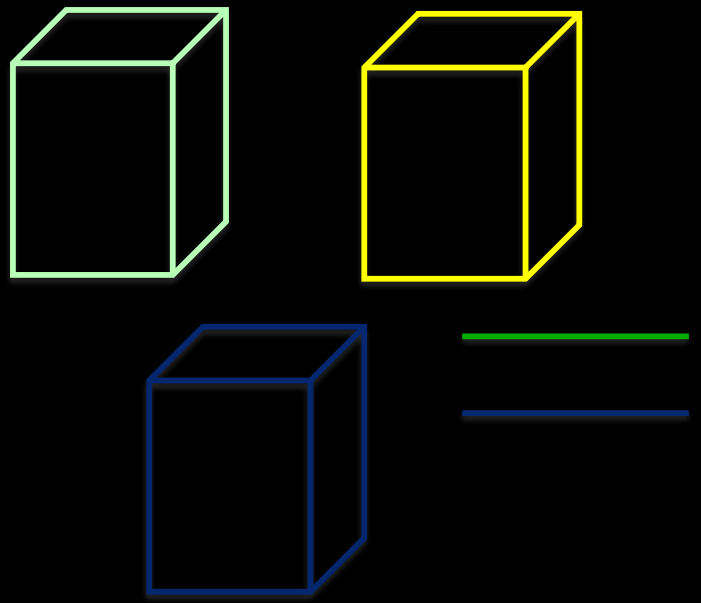
100+ ECUs

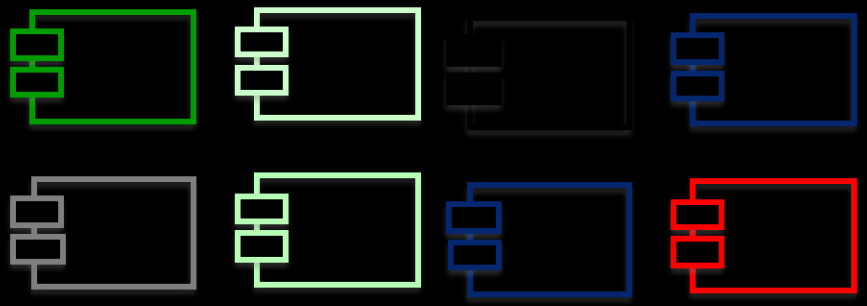
Research question:

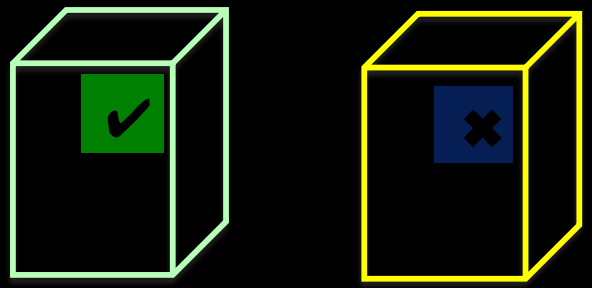
Can we do a better job of finding a topology automatically?

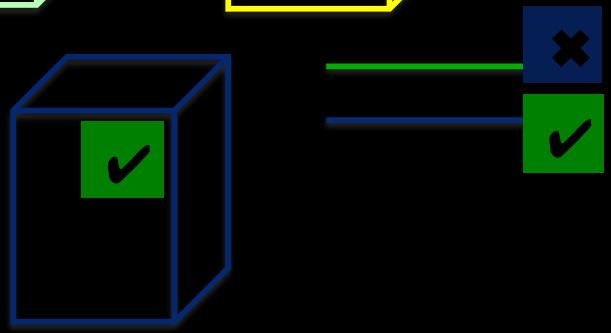


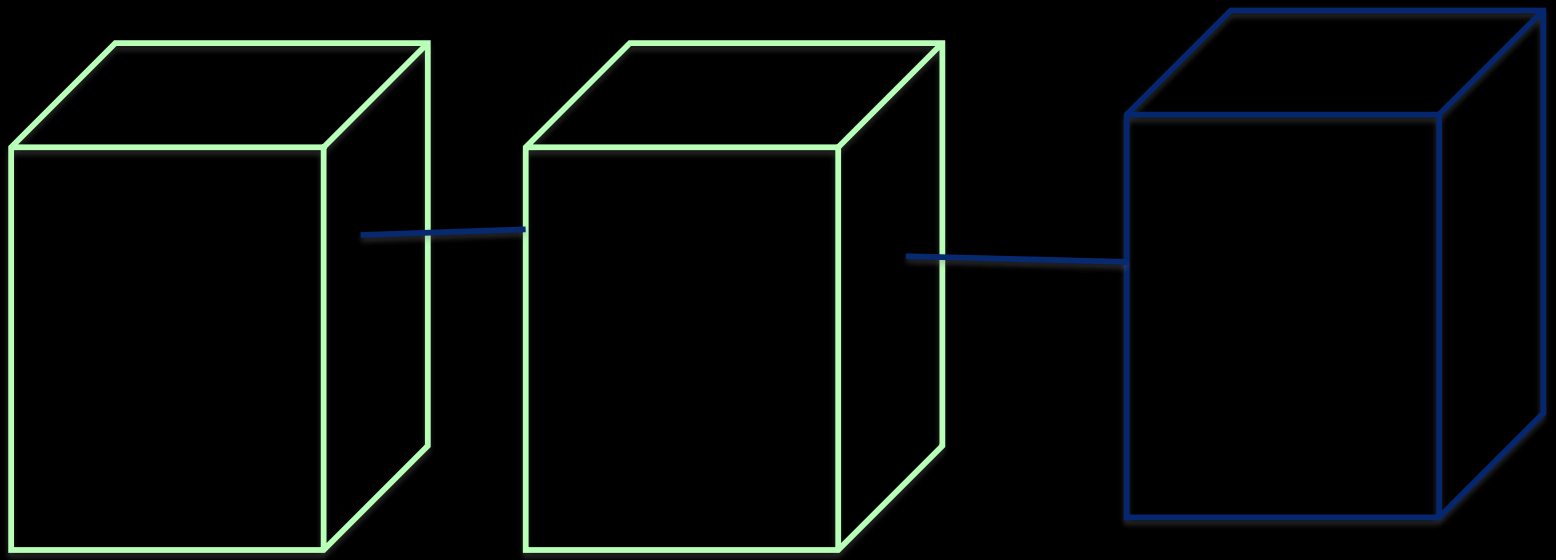


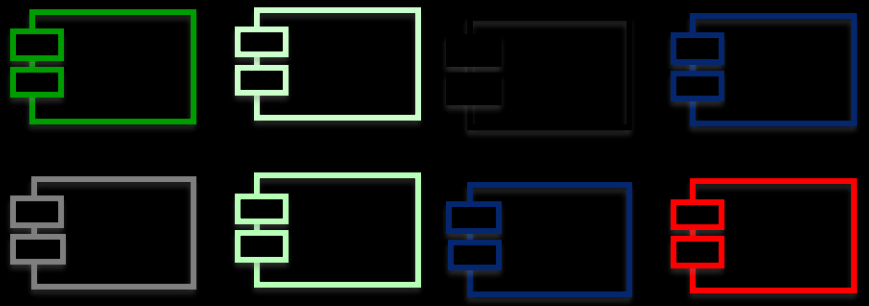


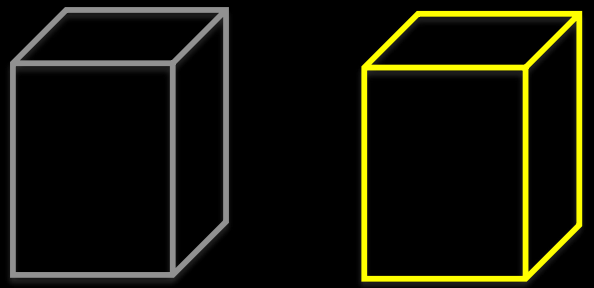


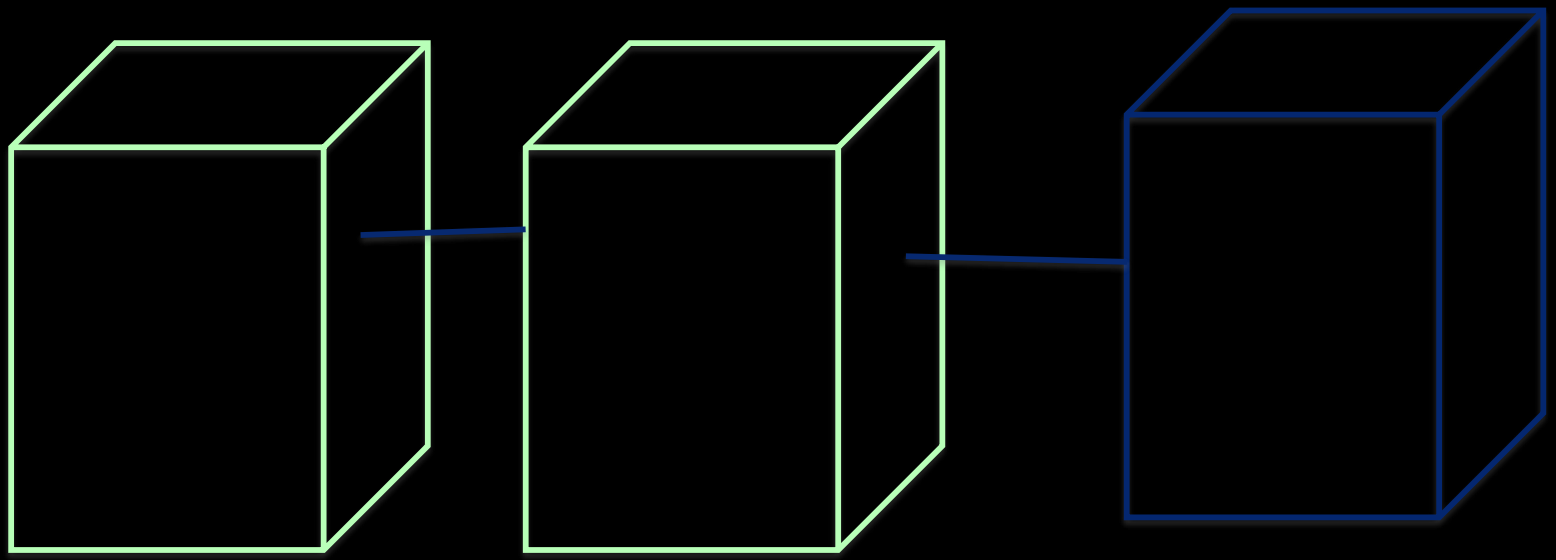




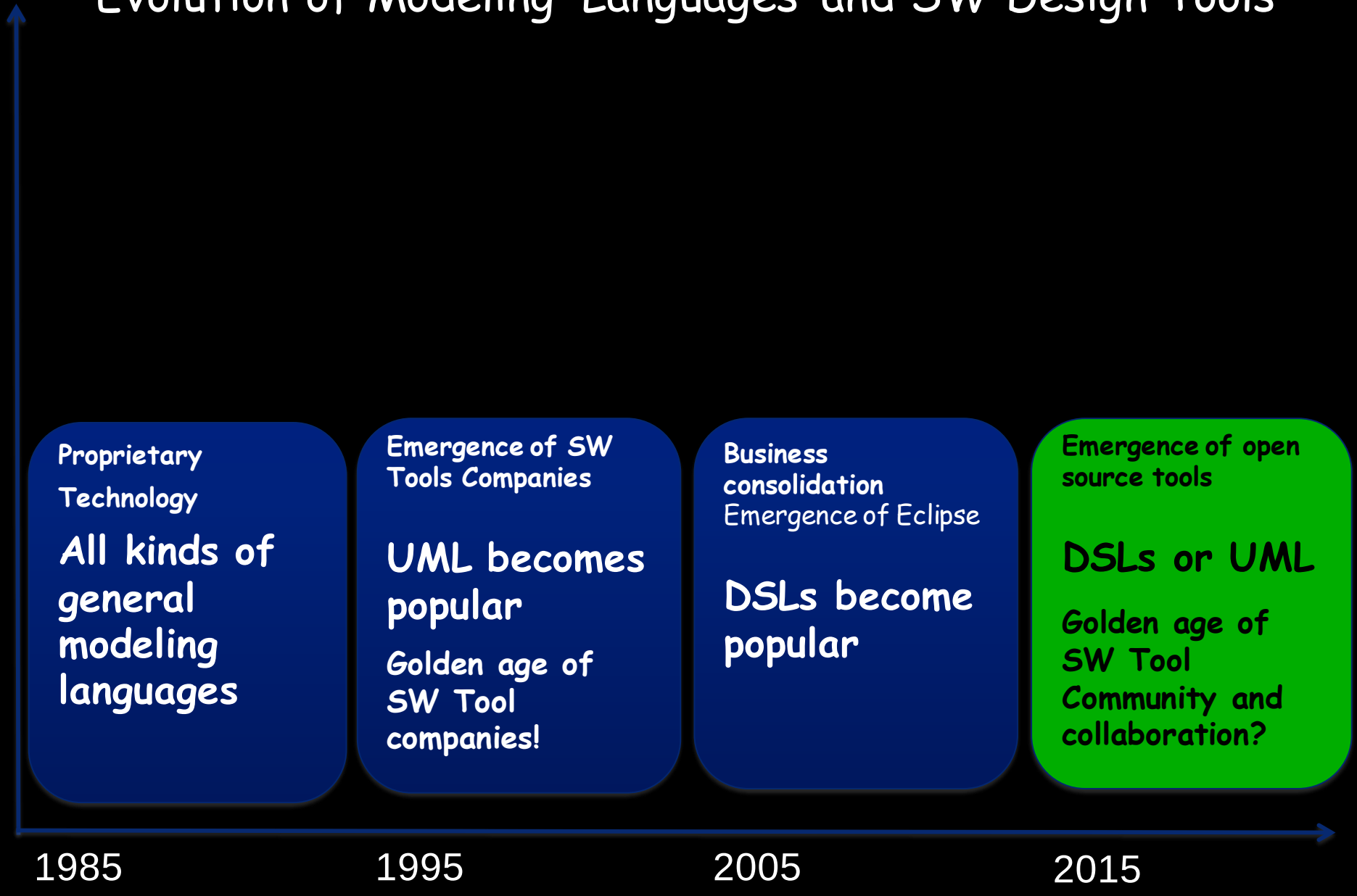








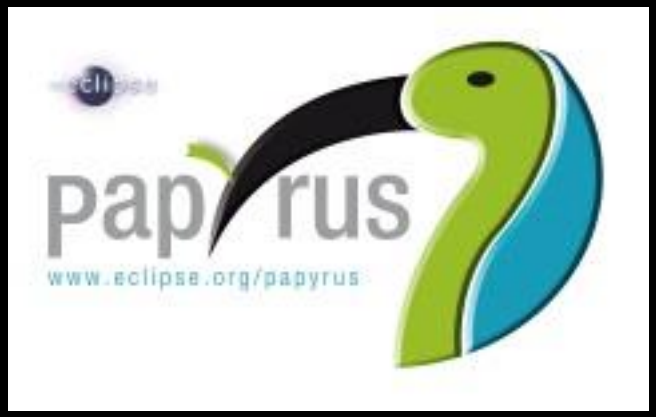
Evolution of Modeling Languages and SW Design Tools



One example of a Open Source Modeling tool

Academia

Companies



eclipse

What about complexity

Functionality

Companies like Ericsson putting millions into it …

Model Driven Software Development

Who am I (working)?

- Teaching about object oriented system development for 15-16 years. For the last 12-13 years been the main instructor.
- Particular interested in modeling, the main focus of this course.
- Collaborate a lot with the industry, Ericsson, Volvo Car, Volvo Truck …
- Active in the modeling research community and have several papers in this area.
- Enjoy collaborating with industry via PhD students and master students. In particular when there are some research issues involved.

My Family

Rock climbing

Skiing

Traveling

Mount biking

Trekking

Kayaking

Kiting

Introduction and pre-study

Supervisors

- Rogardt Heldal
- Magnus Ågren
- Anthony Anjorin
- Thorsten Berger
- Regina Hebig

Course structure

- Two lectures a week
  - Tuesday 13.15 – 15.00
  - Thursday 13.15 – 15.00
- 3 Assessment Exercise
  - Will be done in combination with lectures
- Group work
  - Mandatory meetings every week with a supervisor
    - support the development of the project
- Oral exam on the project work and course material
  - Time and place will be given later
- Individual report

Reading material

- There will be no course book, but you are responsible to find reading material on the topics covered in this course.
- Two books related to this course:
  - Applying UML and Patterns (Craig Larman) (An Introduction to Object-Oriented Analysis and Design)
  - UML 2 and the Unified Process (Jim Arlow and Ila Neustadt)

- We will add other recommended reading on the course home page during the course.

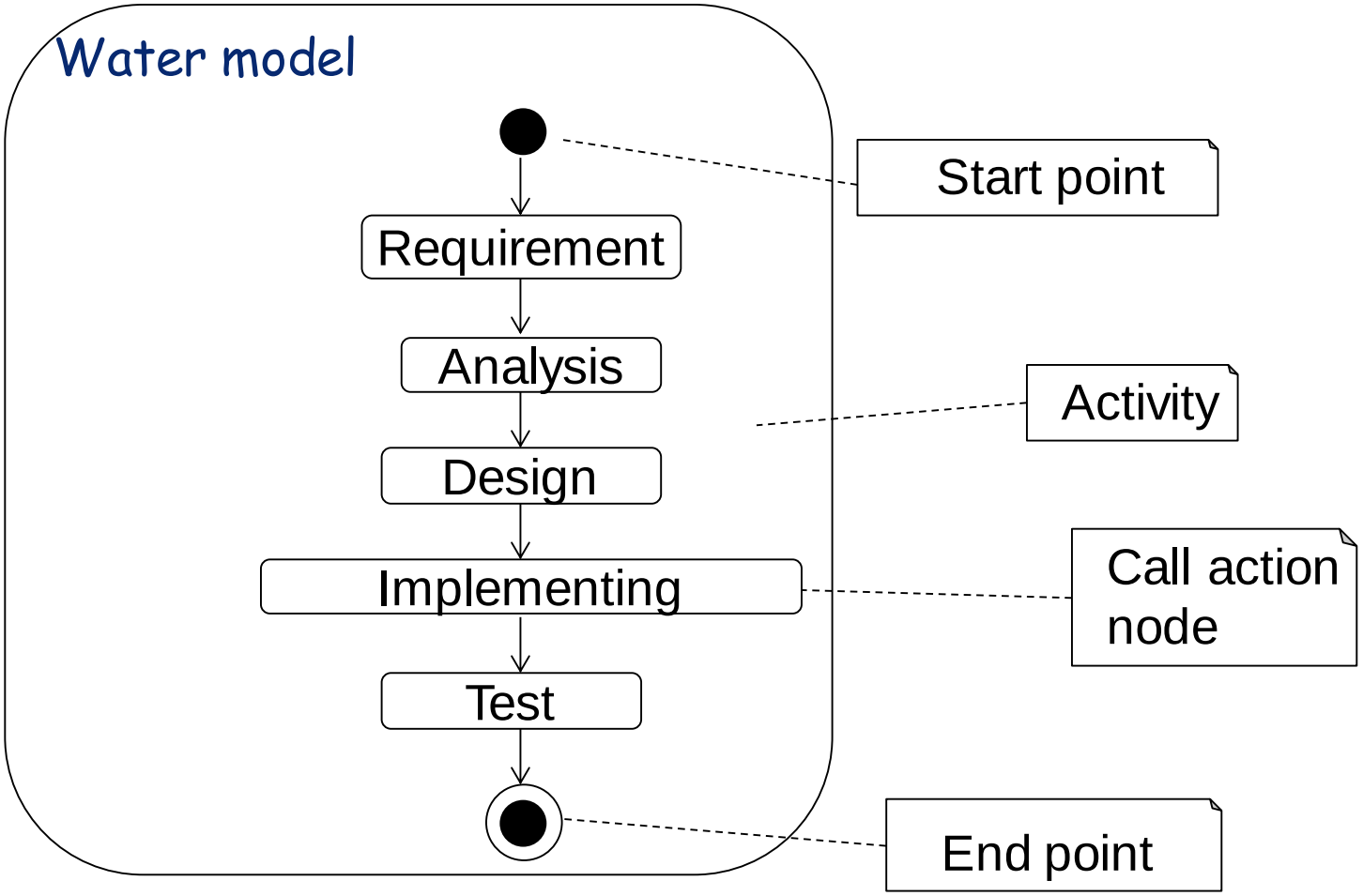
Course Home Page

- **The course home page can be found at:**
  - **http://www.cse.chalmers.se/edu/course/TDA593**
- In this lecture we will highlight important issues considering the course, but all of you should also read the course home page carefully. There will be more details.
- The course home page will be updated during the course.
- Changes done to the course home page will be indicated as news in the beginning of the course home page, with the exception of lecture notes, project assignments which will be added without notification.

Project work

- Done in groups of 8 students. Groups will be formed today.
- New assignment every week, see course home page.
- Mandatory meetings with supervisor every week, but you should have more meetings yourself to discuss and solve the week's assignment.
- Examination of project and course material:
  - Final report together with an oral examination
  - Contribution and time report
- For more details see the course home page.

Work flow/processes



Contribution among members

- **100% -> Divide on group members**

Groups

- Groups:
  - Tuesday 08.00 – 09.45 (3 groups)
  - Tuesday 10.00 - 11.45 (3 groups)
  - Tuesday 15.15 - 17.00 (3 groups)
  - Wednesday 16.00-18.30 (4 groups)
  - Thursday 08.00 – 09.45 (3 groups)
  - Thursday 10.00 – 11.45 (3 groups)
  - Thursday 15.15 – 17.00 (3 groups)

Group Nr:_____

Name	SSNr	Project											Individual	Assessment exercise					Grade
		1	2	3	4	5	6	7	pass	Contribution	Grade	Executable		1	2	3	sum	Grade	

Time:_____ Place: _____
Supervisor: _____

Contact person: _____email:_____telephone:_____
Reserve: _____ ___ email: _____ telephone:_____

PROJECT

What we will look at

- How well:
  - the system is documented using software models
  - you have obtain a creative solutions using models
  - you have created a workable solutions
  - you have created a good solutions
- You will obtain extra point if the solutions are more complex, for example, distributed system, layered architecture, use of databases and user interface
  - But, one obtain extra points only if this is documented as software models as well as a working implementation.
- It is also important to get through how much support you had in using software models

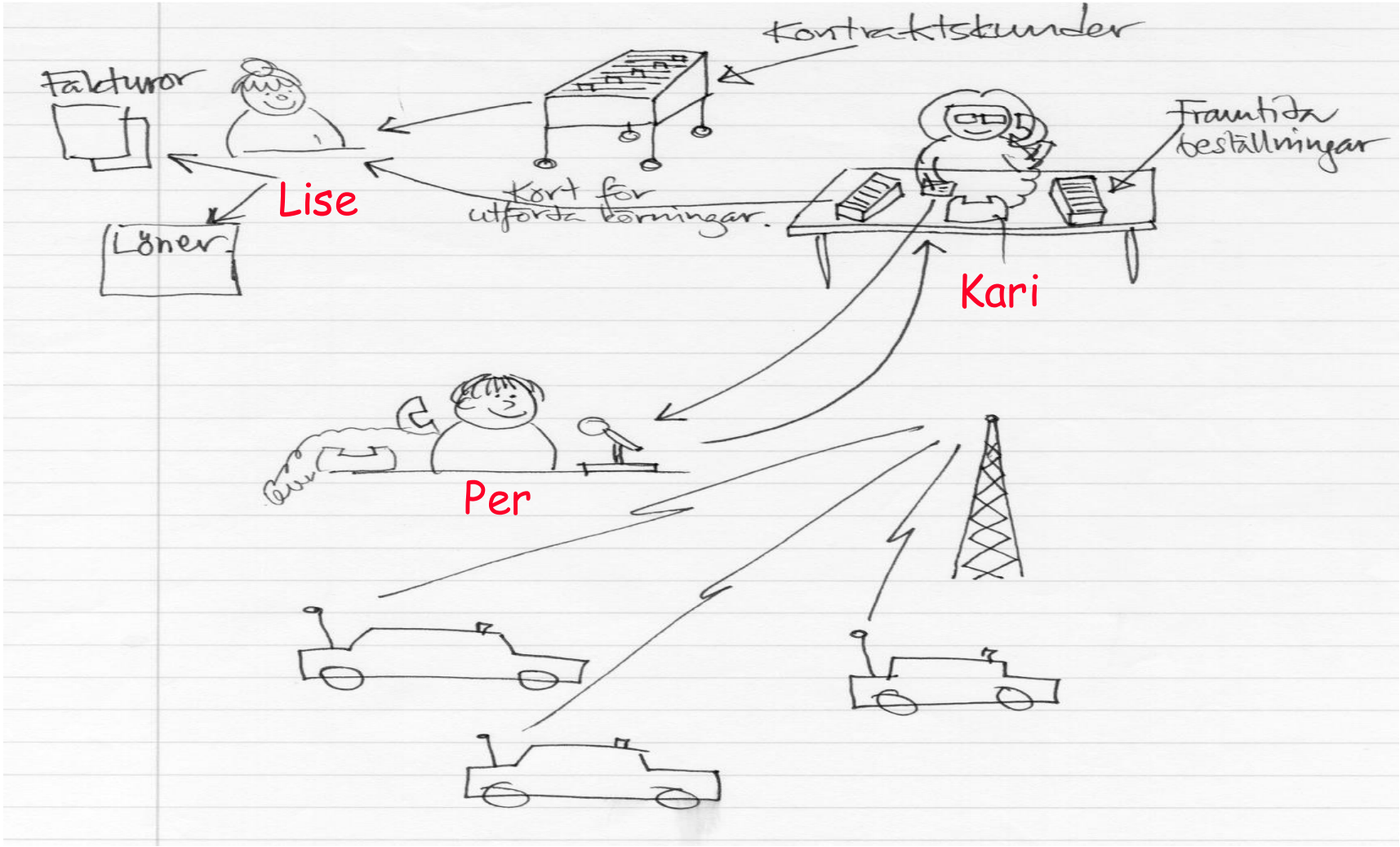
Individual report

- This report shall contain information about the project part you were responsible for. Mostly reflection on what you did and why.
- There will also be a few questions that you need to answer which will be related to the project.

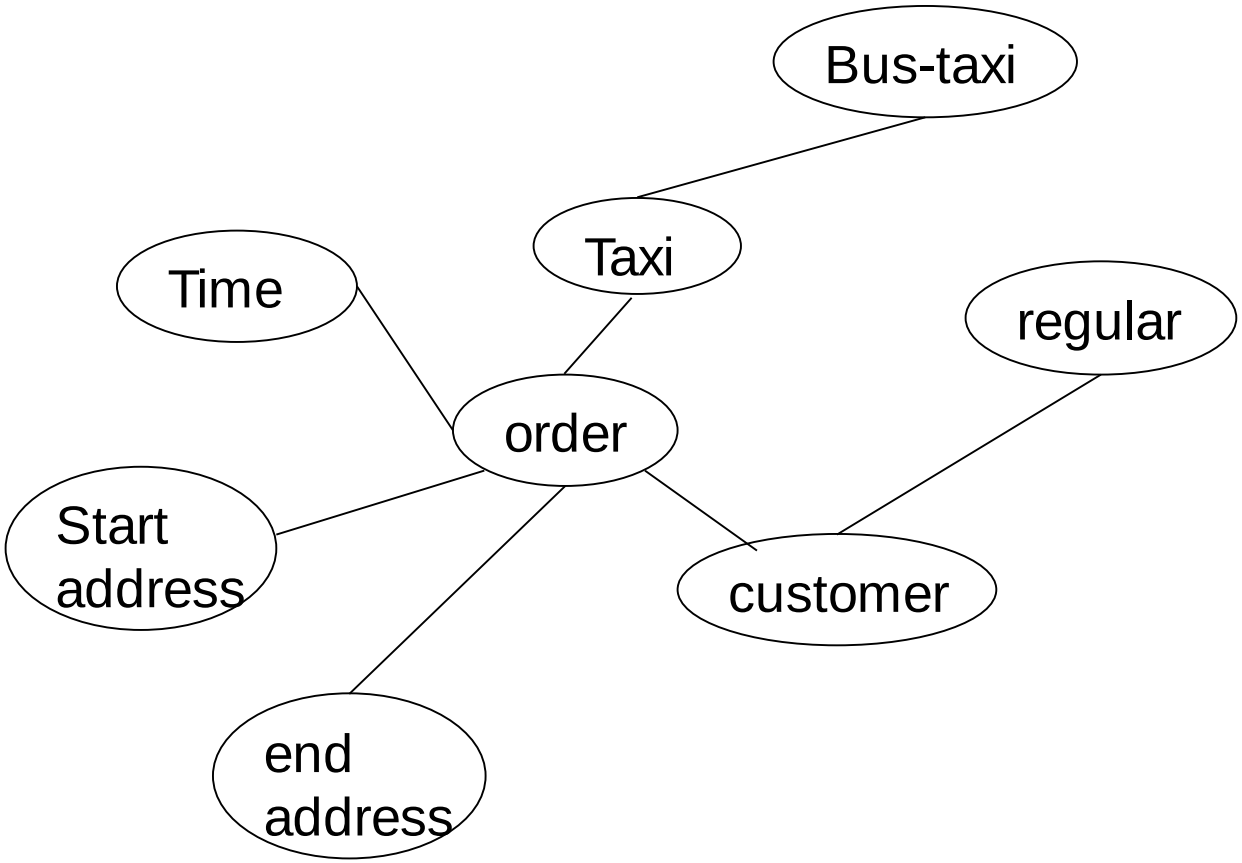
Pre-Study

- Give an introduction to the project which is part of this course.
- Show some techniques which can be useful in describing a business.

Example: Taxi company



Mind Maps


Bus-taxi
Taxi
Time
regular
order
Start address
customer
end address

The Course's Project

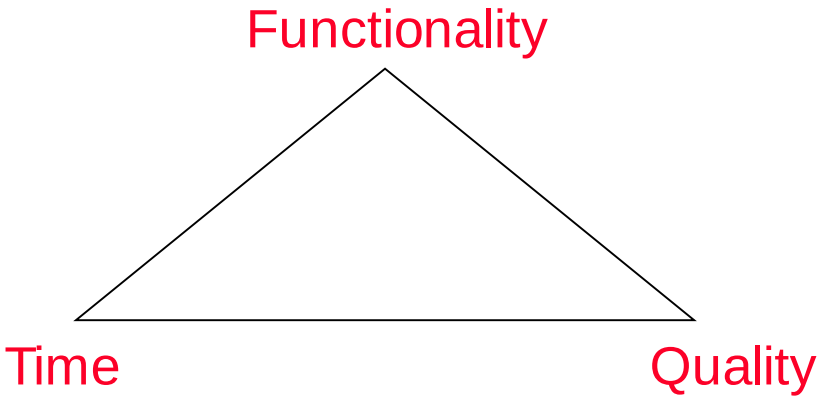
- A company contacts us and asks us to produce a design and a prototype of a hotel booking system.

They present us with an:

- A idea of what the system should do.
- A budget based on what they are willing to pay.
- A deadline for completion of the design.

Correct level

- First step is to find out what is most important for the customer.



Idea and budget

- **Idea**
  - A hotel system (For more information see handout).
- **Budget**
  - Budget is normally about money, but it is possible to calculate using points instead.

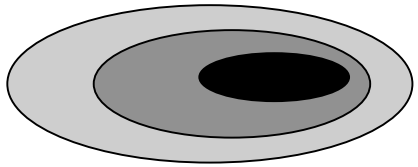
Deadline

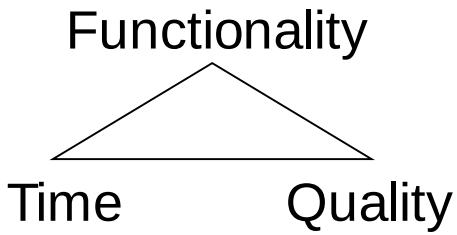
- **Deadline**
  - An initial design shall be ready at the end of this period.
  - There will be weekly deadlines.

Work process

- Step 1:
  Brainstorming.

- Step 2:
  1. Find the smallest useful system
  2. Find the dream system
  3. Find levels between 1 and 2





- Step 3:
  - Choose right level on the basic of time, money and quality (in your case: time, points, and quality)

What should you do first week?

- A definition of the responsibilities of a team member.
- The goals and objectives of the team.
- A text description of your system. You have to justify your decisions and make explicit the features you have chosen not to include.
- A revised list of requirements. Focus on functional requirements but indicate which non-functional requirements will be important.
- A discussion or ratonale of your requirements.
- Include documents that make your report stronger, like mind-maps, drawings, or interviews. These can be included in an appendix.

Collect information

- Look at hotel booking systems on the Web
- Conduct interviews with people working at hotels, in particular the hotel manager if you can
- Interview travel agency
- Any information found on the web, books etc.
- Discuss the hotel business domain with your supervisor (this should not be the main source!)

Appendix

Definition - IEEE [1990]

- A requirement is:
- (1) A condition or capability **needed** by a user to solve a problem or achieve an objective.
- (2) A condition or capability that **must** be met or possessed by a system or system component to satisfy a contract, standard, specification, or other formally imposed document.
- (3) A documented **representation** of a condition or capability as in (1) or (2).

Requirements Engineering

- Elicitation – to identify the requirements
- Specification – to document the requirements
- Validate – to check the requirements
- Prioritization – to select the best requirements

- You will do Elicitation, Specification, and Prioritizing till next week.

Elicitation: Get out there!

- ”You cannot sit in your office and produce requirements based on intuition and logic. You have to **discover** the non-trivial requirements from users and other stakeholders.”

- Comments: you will probably get a really low grade if you don’t get out there and learn the domain.

Collect information

- Looking at hotel booking system at the Web
- Conduct interview with people working at the hotel, in particular the hotel manager if you can
- Interview travel agency
- Any information found at the web, books etc.
- Discuss the hotel business domain with your supervisor (this should not be the main source!)

- But also, do brainstorming and discussion in the group!

Functional requirements

- Wikipedia:
  - As defined in requirements engineering, functional requirements specify particular results of a system.
  - This should be contrasted with non-functional requirements which specify overall characteristics such as cost and reliability.
  - Functional requirements drive the *application architecture* of a system, while non-functional requirements drive the *technical architecture* of a system.

We want …

- Functional requirements that:
  - Are well written
  - Have a unique id
  - Are testable
- You may hierarchically group your requirements