Bachelor Course Systems Engineering: Architectural Reasoning; Homework

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Abstract

This is the homework for a course for bachelor students in systems engineering for the part architectural reasoning

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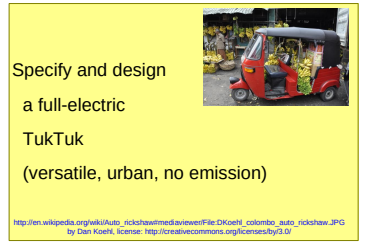


Schedule

Monday January 21, 12:00 lecture, 13-16 class work

Thursday January 24, 10:00 lecture, 11-15 class work

Thursday February 7, submit homework 1

Monday February 18, 12:00 lecture, 13-16 class work

Thursday February 21, 10:00 lecture, 11-14 class work

Monday March 11, submit presentation of homework 2

Monday April 8, submit individual reflection report of homework 2

Case during this course

Specify and design

an autonomous waste collector.

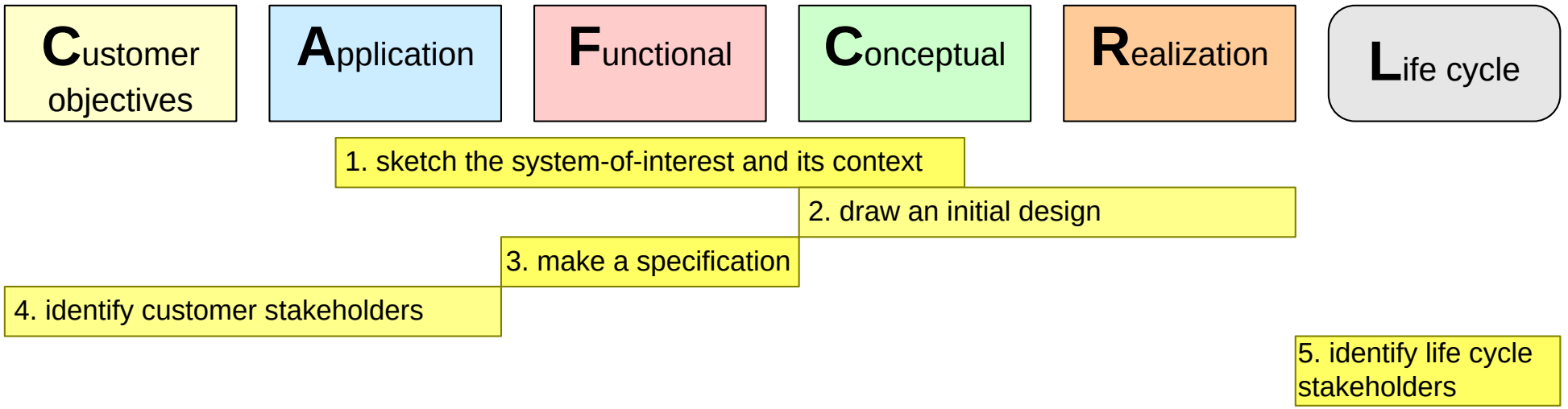
This collector finds and removes waste from the environment.

Class-work Day 1: Exploration

Use time-boxes of 15 minutes and perform the following steps:

- Sketch the system-of-interest and its immediate context
  - Annotate the sketch (e.g. main components, interfaces, functions, …)
- Draw an initial design
- Make a specification of the system-of-interest (view it as a blackbox)
  - What functionality, performance, interfaces, standards or regulations
- Identify the main customer stakeholders and their concerns
- Identify the main life cycle stakeholders and their concerns
- Review and make a plan to consolidate in a presentation

Class-work Day 1 mapped on CAFCR



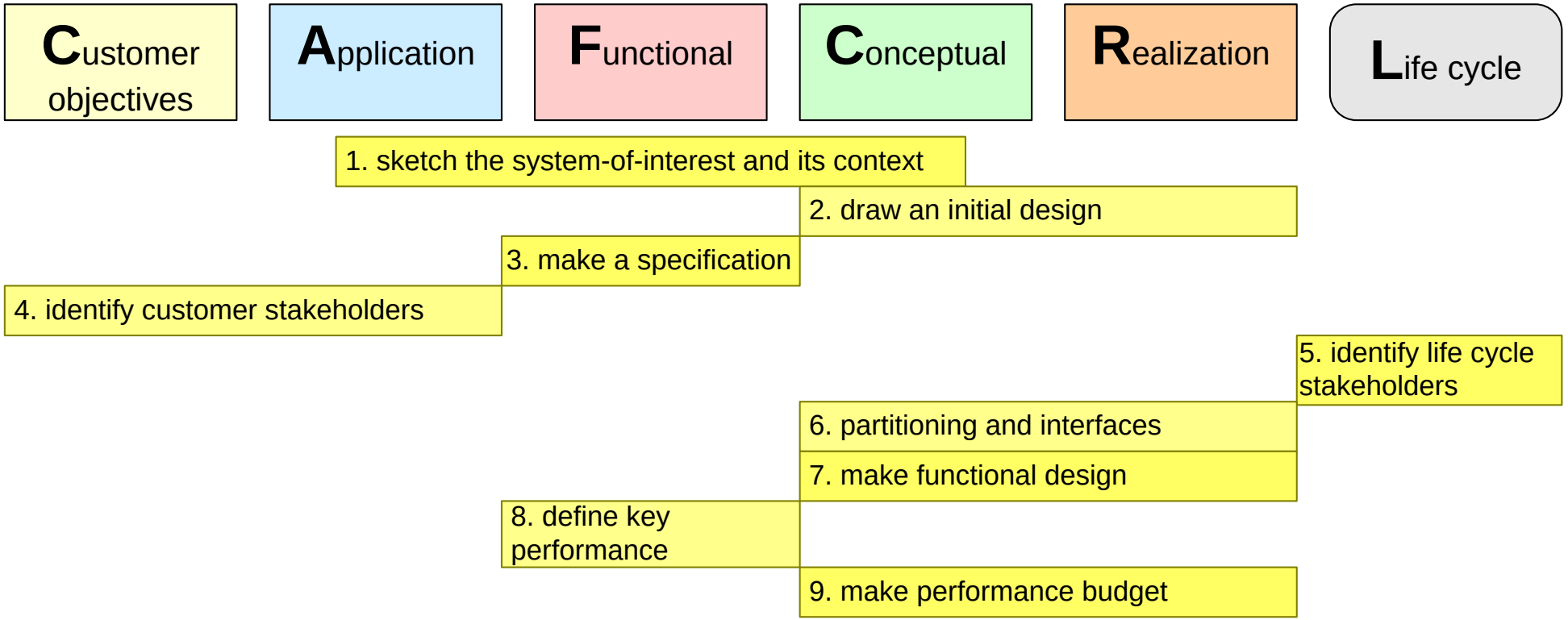
Class-work Day 2: Elaboration

Start second iteration by elaborating FCR views

Use time-boxes of about 30 minutes

- Decompose the system in subsystems, decompose one subsystem in subsubsystems.
  - Show the subsystems and interfaces in a block diagram
- Make a functional model of the internals of the system-of-interest
  - Use one or more diagrams to show the dynamic behavior
- Define 5..10 Key Performance Parameters of the system-of-interest
  - Define a use case to support the definition of KPPs
- Make a technical budget for one of the key performance parameters
- Review and make a plan to consolidate in a presentation

Class-work Day 2 mapped on CAFCR



Homework after Day 2

Transform your results in electronic form (e.g., PowerPoint or Visio)

Develop two alternative solutions/concepts

Compare the three solutions using a Pugh matrix

- define 5..10 criteria for comparison
- score the solutions on a scale from 1 (poor) to 5 (very good)

Make a list of questions triggered by the first iteration

Search for facts to ease the next class-work

Home work instructions

Homework instructions

presentation

filename: BSEAR team<your teamnumber> homework<number>

e.g. BSEAR team1 homework1.ppt

all team members on front page

email to: <gerrit.muller@usn.no>

cc: Jamal

subject: homework BSE team<your teamnumber> homework<number>

from/cc: <all email addresses of team members>

Class-work Day 3: Elaboration CA-views

Continue second iteration by elaborating CA views

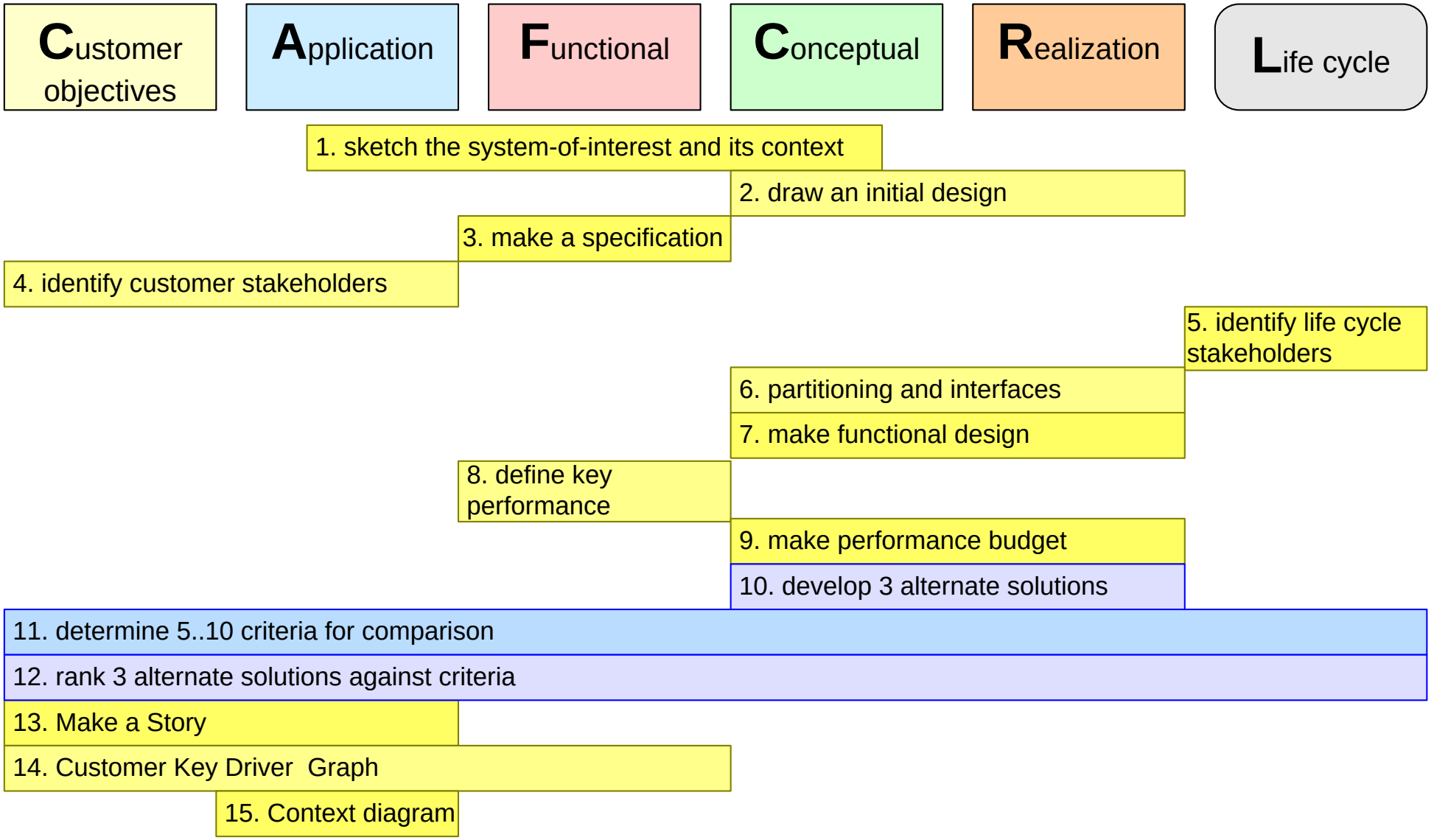
Use time-boxes of about 40 minutes

- Develop a story that helps you to understand the customer better and that facilitates analysis of specification and design
  - Verify your story against the story criteria
- Develop a customer key driver graph
  - Start with Key Performance Parameters and ask “why (is this needed)” repeatedly.

Use time-box of about 20 minutes for the remaining task

- Make a context diagram

Class-work Day 3 mapped on CAFCR



Class-work Day 4: Elaboration Life Cycle

Continue second iteration by elaborating life cycle view

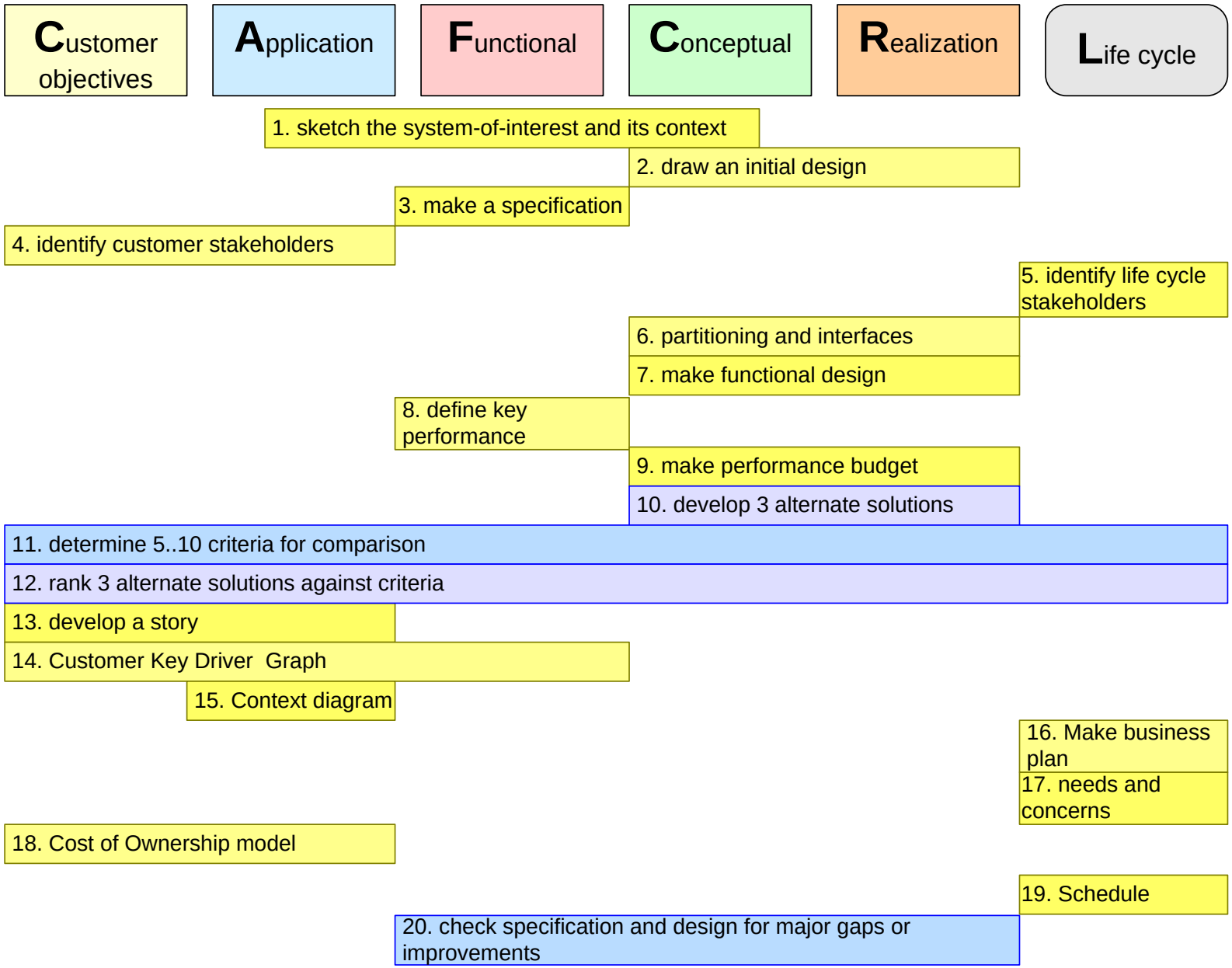
Use time-boxes of about 30 minutes

- Develop a business plan for your company
  - determine your role in the value chain
  - determine income, expenses, and investments
  - estimate cash flow as function of time
- Identify needs and concerns from life cycle stakeholders
  - determine life cycle key drivers and key performance parameters
- Make a Cost of ownership estimate for customers

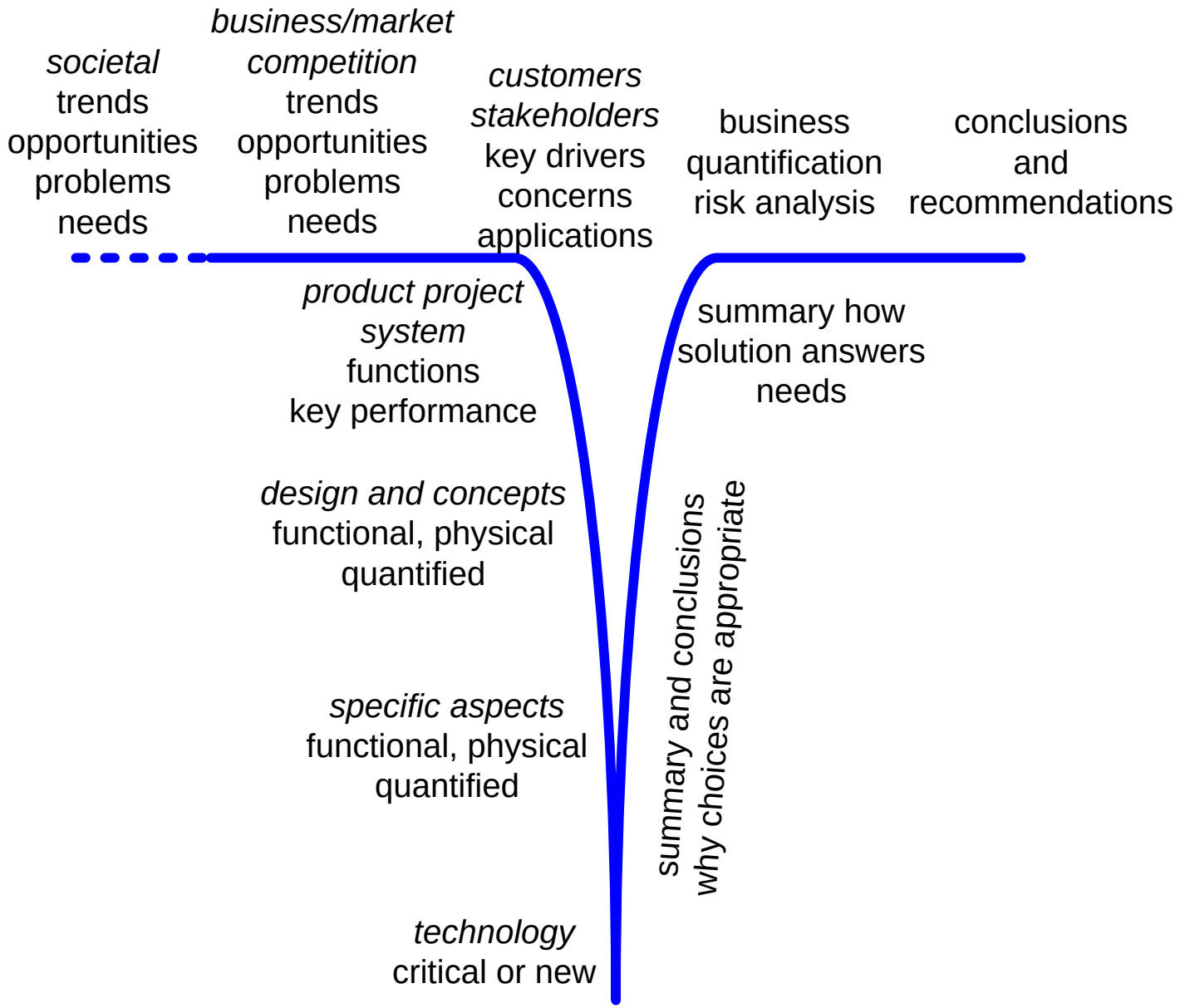
Use time-box of about 20 minutes for the remaining task

- Make a schedule for development and start of deployment

Class-work Day 4 mapped on CAFCR



T-shaped Presentation



Homework after Day 4

Check specification and design for major gaps or improvements

Transform your results in electronic form (e.g., PowerPoint or Visio)

Make a T-shaped presentation for your management; its main purpose is to take a go/no-go decision

Write an individual reflection report, max 2 A4s:

- What are your main learning points?
- What aspects deserve most attention in next phase of your project? Explain why.

Case previous course

Specify and design

an autonomous track/road maintainer for elderly Norwegians.

This robotic vehicle, amongs others, keeps the drive to their home fully operational (in winter).

Case previous course

Specify and design an

Unmanned Humanitarian Response/Support Vehicle,

which will be able to reach locations with

poor, bad, or destroyed access.

Case previous course

Specify and design

a full-electric

TukTuk

(versatile, urban, no emission)

http://en.wikipedia.org/wiki/Auto_rickshaw#mediaviewer/File:DKoehl_colombo_auto_rickshaw.JPG
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Case previous course

Specify and design

a full-electric

drive-by-wire

race kart

photo http://nl.wikipedia.org/wiki/Bestand:Outdoor-karting.jpg