Abstract

This document described the assignments during the SEMA course. The teachers alternates brief theory lectures with these assignments. The teacher may skip a few assignments, when too little time is available.
Case Selection

- Determine the system of interest
- Define your organization
- Determine an innovative change to be architected
Sketch the System-of-Interest in its context

- Show some of the internals of the system-of-interest
- Indicate the boundary of the system-of-interest
Create a story

as text + sketch or as cartoon

Use the criteria

be highly specific!

envision the future value proposition

Enjoy!
Use Case Exercise

Make specification overview with ~10 **SMART** Key Performance Parameters (or functions or interfaces)

determine at least one use case

interfaces

system seen as black box

functions
quantified characteristics

restrictions, prerequisites
boundaries, exceptions
standards, regulations

• **Specific** quantified

• **Measurable** verifiable

• **Achievable** (Attainable, Action oriented, Acceptable, Agreed-upon, Accountable)

• **Realistic** (Relevant, Result-Oriented)

• **Time-bound**ed (Timely, Tangible, Traceable)

use case
typical use with relevant context data (quantified!)
Capture the **dynamic behavior** of the **internals** of your system in **multiple** diagrams.

Diagrams that capture dynamic behavior are among others:

- Functional flow (of control or information, material or goods, or energy)
- Activity or sequence diagrams (e.g. with “swimming lanes”)
- State diagrams
Make a set of block diagrams capturing the static parts and interfaces.

Ensure coverage of the entire system, e.g. including service, training, production, etc.

Show both hardware and software

Good block diagrams have in the order of 10 to 20 blocks
Make a **customer key driver graph**

Use yellow note stickers

Start at the right hand side

- why
- 5 m/s
- why
- <200 Kg
- 5 hrs
Make a **technical budget** for one of the **key performance parameters**.

- a good budget has 20 to 30 contributing elements
- elements should be balanced (remove or combine insignificant contributions)
- use the previously defined parts and dynamic behavior
Make a **decision matrix** for one of the **concept selections**.

- define at least 3 concepts
- define 7 to 10 criteria for selection
- score the concepts against the criteria, for example using a scale from 1 to 5: 1 = very poor, 5 = very good
- recommend a concept with a rationale

<table>
<thead>
<tr>
<th></th>
<th>concept 1</th>
<th>concept 2</th>
<th>concept 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>criterion 1</td>
<td>1</td>
<td>3</td>
<td>5</td>
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<tr>
<td>criterion n</td>
<td>4</td>
<td>4</td>
<td>2</td>
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*best, because ...*
Exercise Business Plan

Make a **business plan** for the mid to long-term future.

- determine business model
- determine investments, sales volume, sales price, and costs
- estimate the cash flow and accumulated profit
- include at least 3 releases or generations of systems
Exercise Life Cycle

Analyze the **evolution** during the **lifecycle**.

- identify sources of change in customer context, life cycle context, and technology
- make a list of changes
- determine per change the expected rate of change and the required response time to the change
- optional: determine effort, impact, and risks per change
Make a **line of reasoning** for one of the dominant qualities.

- in the CA views; determine what customers do to achieve their goal
- in the F view determine the specification of your system supporting this quality
- in the CR views determine the relevant concepts and technologies
- Take the reverse viewpoints as well: what threatens this quality?
Exercise Threads of Reasoning

1. Select 3..5 most important needs and concerns
2. Select 3..5 most important specification issues
3. Select 3..5 most critical design aspects
4. Select 3..5 most critical life cycle and business issues
5. Show relations positive negative
6. Transform into elevator pitch
“Spaghetti” after Step 5
Elevator Pitch of about 90 seconds

- Customer value proposition
- Business proposition
- System requirements
- System design & technology

Selling and explaining the proposal while managing expectations and engaging management in design and technology challenges.
Identify a chain of models needed to support architecture development.

- models are related horizontally in the CAFCR model (across views), as well as vertically within a view
- models have various levels of detail; detailed models tend to feed/support less detailed models
- per model
  - formulate its purpose
  - indicate the main quantities that play a role
Determine for a few models their **credibility, accuracy, and working range**.

- Identify top 3 credibility risks
  - identify biggest uncertainties in inputs, abstractions and realization
- Estimate accuracy of results; quantitative, e.g. order 1% or 50%
  - based on most significant inaccuracies of inputs and assumed model propagation behavior
- Identify relevant working range risks
  - identify required (critical) working ranges and compare with model working range
**Exercise Wrap-Up**

Capture your work done during the course, e.g. make photos of the flip charts.

Make a list of questions, assumptions, biggest uncertainties and unknowns

Make a list of lessons learned

Make a plan for the homework