SEMA Assignments

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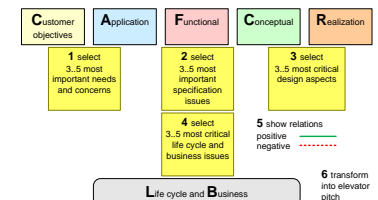e-mail: `gaudisite@gmail.com`

`www.gaudisite.nl`

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.

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Case Selection

Determine the system of interest

Define your organization

Determine an innovative change to be architected

Create a Project Overview of the Case

Create a Project Overview for your case

Project Title	meta information, e.g. version, date, author, owner

Project Goals

- 3 to 5 specific and quantified objectives

Key Performance Parameters

- 5 to 10 specific and quantified requirements

system context

- sketch the next generation system
- indicate changes compared to the current generation system

system of interest

- sketch your next generation subsystem, module, or function
- indicate changes compared to the current generation subsystem

project master plan with timeline

- first light, prototype shipment, 1st SAT @OEM, 1st SAT @OEM's customer, start volume production

other relevant project infomation

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Homework; Discuss and Update Case Overview

Contact the project and team leaders.

Have a dialogue on the case overview.

Adjust the case overview.

Annotate where uncertainties are.

Create a Project Overview for your case

Project Title   meta information, e.g. version, date, author, owner

system context	*system of interest*	*Project Goals*
• sketch the next generation system	• sketch your next generation subsystem, module, or function	• 3 to 5 specific and quantified objectives
• indicate changes compared to the current generation system	• indicate changes compared to the current generation subsystem	

Key Performance Parameters

• 5 to 10 specific and quantified requirements

project master plan with timeline

• first light, prototype shipment, 1st SAT @OEM, 1st SAT @OEM's customer, start volume production

Sketch the System-of-Interest

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

Exercise StoryTelling

Create a story

    as text + sketch or as cartoon

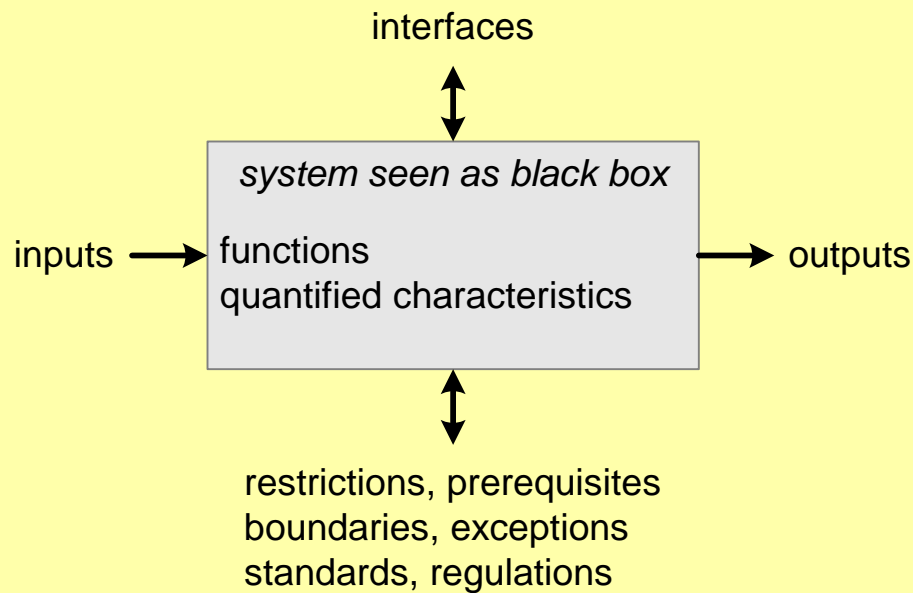Use the criteria

    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

inputs → | → outputs

restrictions, prerequisites
boundaries, exceptions
standards, regulations

use case
typical use with relevant
context data (quantified!)

- **S**pecific   quantified

- **M**easurable   verifiable

- **A**chievable (Attainable, Action oriented, Acceptable, Agreed-upon, Accountable)

- **R**ealistic (Relevant, Result-Oriented)

- **T**ime-bounded (Timely , Tangible, Traceable)

Exercise Dynamic Behavior

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

Exercise Block Diagram

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.
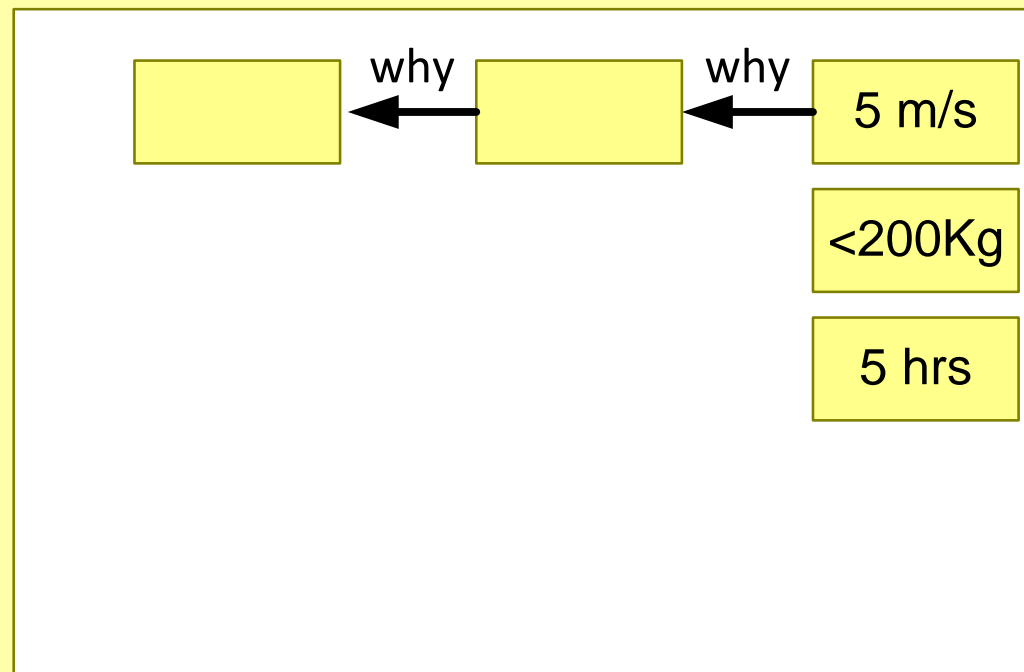
Show both **hardware** and **software**

Good block diagrams have in the order of 10 to 20 blocks

Exercise Customer Key Driver Graph

Make a **customer key driver graph**

Use yellow note stickers

Start at the right hand side

Exercise Budget

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

Exercise Concept Selection

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

	concept 1	concept 2	concept 3
criterion 1	1	3	5
criterion n	4	4	2
			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

Exercise Line of Reasoning

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

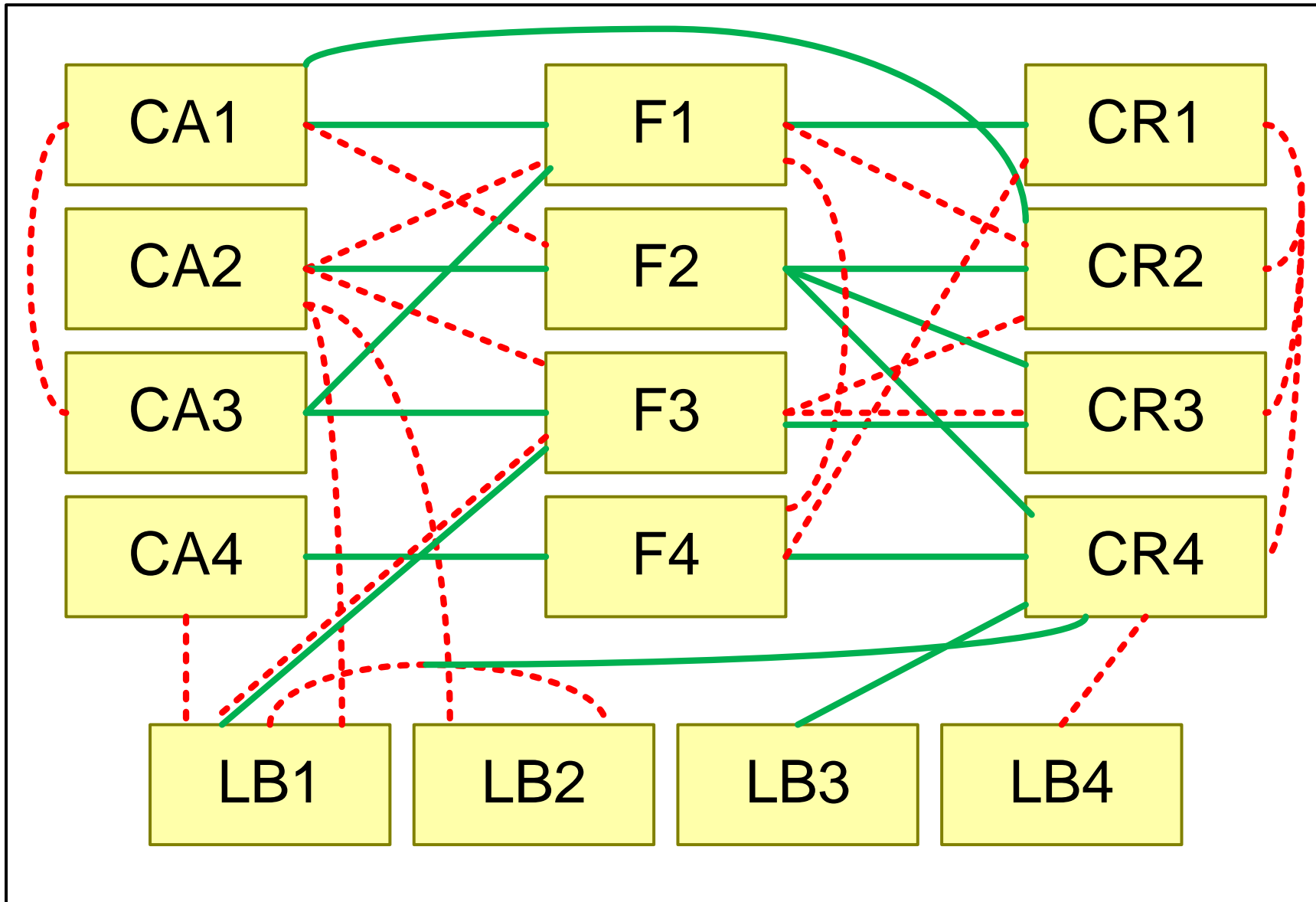| Customer objectives	Application	Functional	Conceptual	Realization

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

Life cycle and Business

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"Spaghetti" after Step 5

Elevator Pitch of about 90 seconds

customer value proposition

business proposition

system requirements

system design & technology

drives

enables

enables

drives

drives

enables

Selling and explaining the proposal

while managing expectations

and engaging management in

design and technology challenges

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Exercise Chain of Models
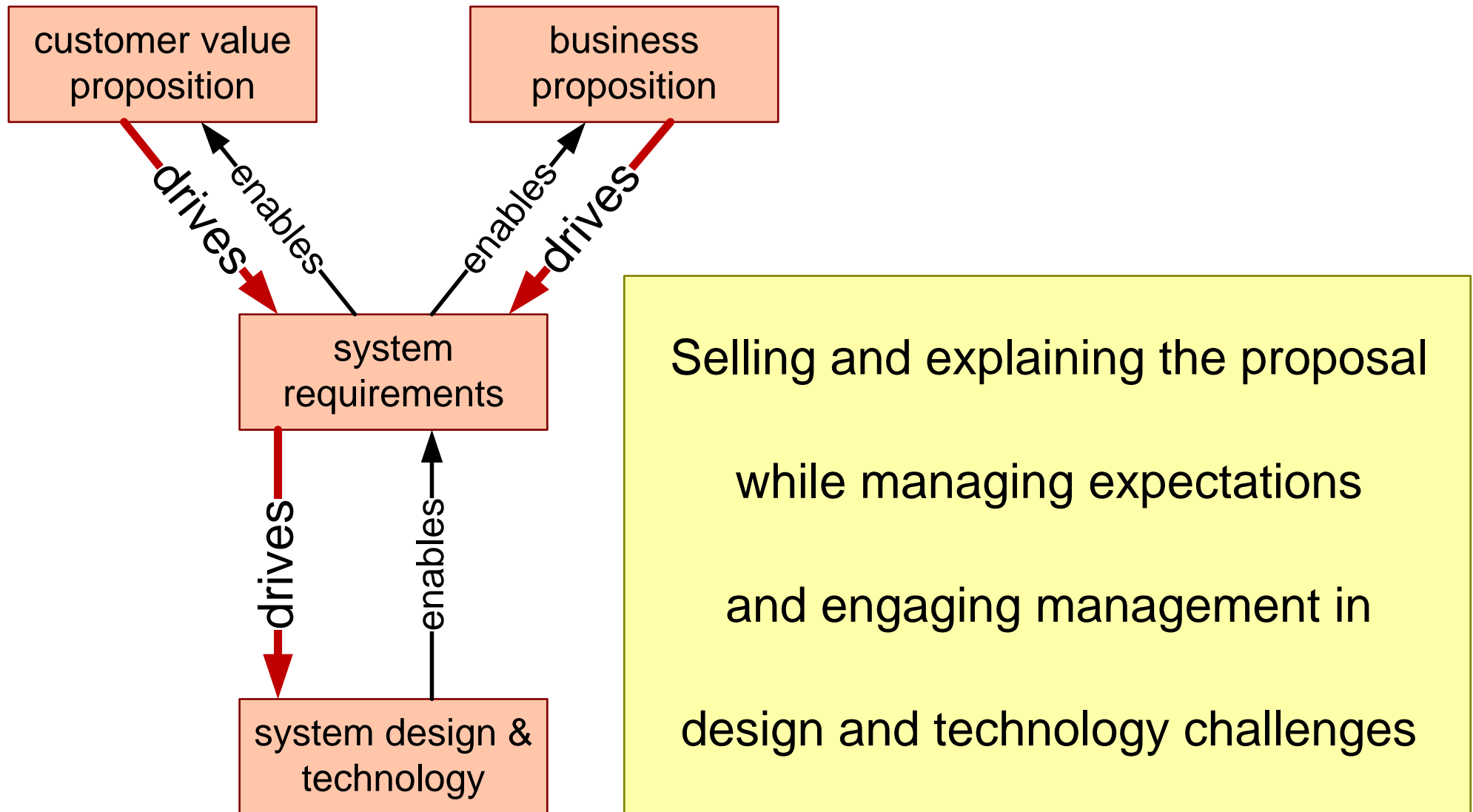
Identify a **chain of models** needed to support architecture development.

- 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

Exercise Analysis of Models

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**