

SEMA System Modeling and Analysis Course

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Abstract

The SEMA course System Modeling and Analysis is a 5 day course. Core of the course is Architectural Reasoning Using Conceptual Modeling. This course uses the CAFCR+ model with 6 views. Qualities connect all views. Threads-of-reasoning capture the architectural reasoning across views and qualities. Conceptual models visualize and capture the context, the system and its design. Quantification is a means to make problem and solution space tangible.

Distribution

This article or presentation is written as part of the Gaudí project. The Gaudí project philosophy is to improve by obtaining frequent feedback. Frequent feedback is pursued by an open creation process. This document is published as intermediate or nearly mature version to get feedback. Further distribution is allowed as long as the document remains complete and unchanged.

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day 1	introduction to modeling	exploring the case
day 2	sample customer space	functions and parts
day 3	customer space analysis	quantification and concepts
day 4	business and life cycle	integration and reasoning
day 5	modeling	wrap-up

Course Program

day 1	introduction to modeling	exploring the case
day 2	sample customer space	functions and parts
day 3	customer space analysis	quantification and concepts
day 4	business and life cycle	integration and reasoning
day 5	modeling	wrap-up

Preparation for the Course

During the SEMA course you work in teams of about 3 persons. Smaller teams (even single persons) are acceptable as well.

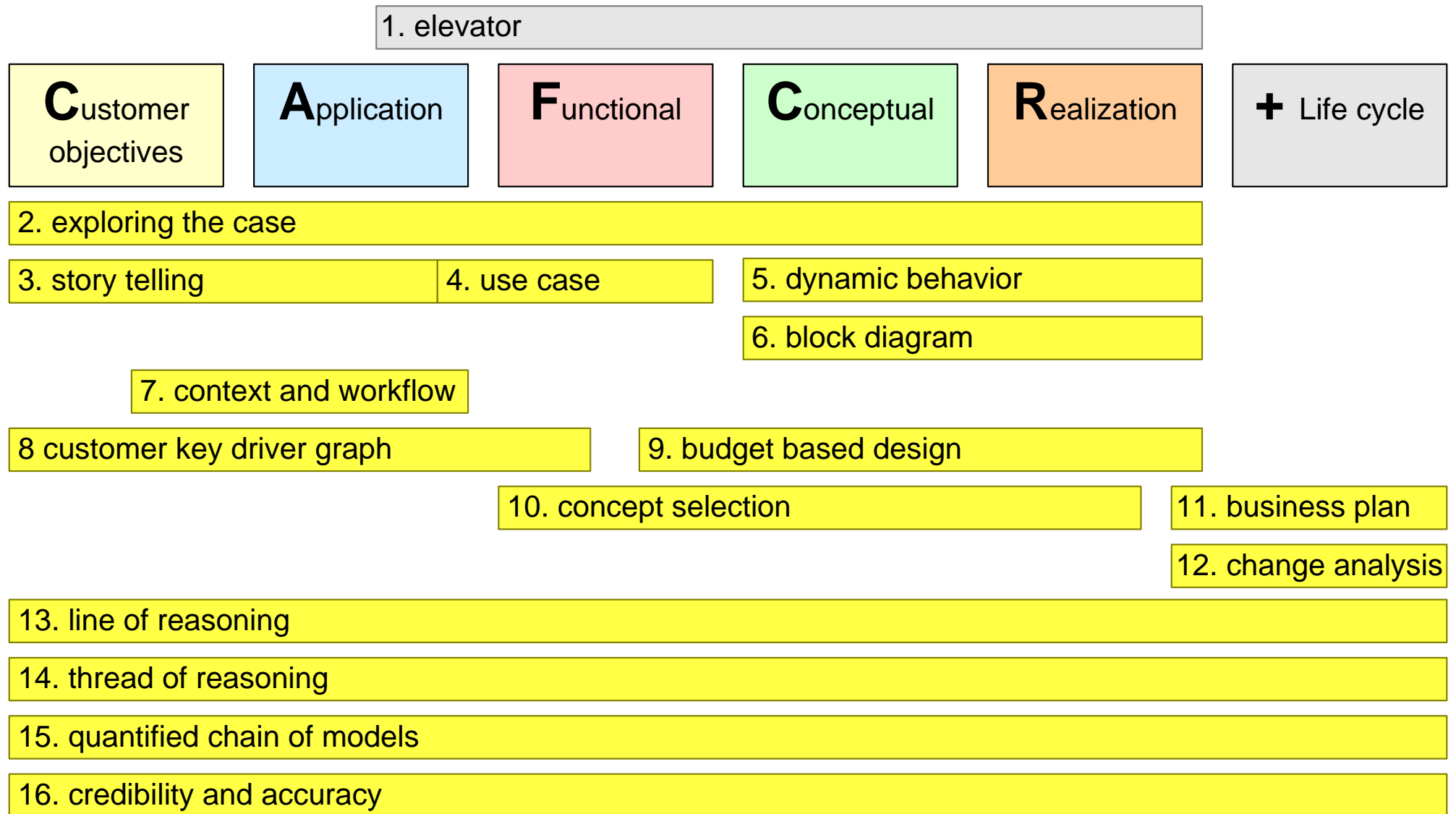
Every team preferably works on a real part of a system with some real development that goes on.

We start to model the status quo of the system and then we will model and analyze a change or addition that is being considered.

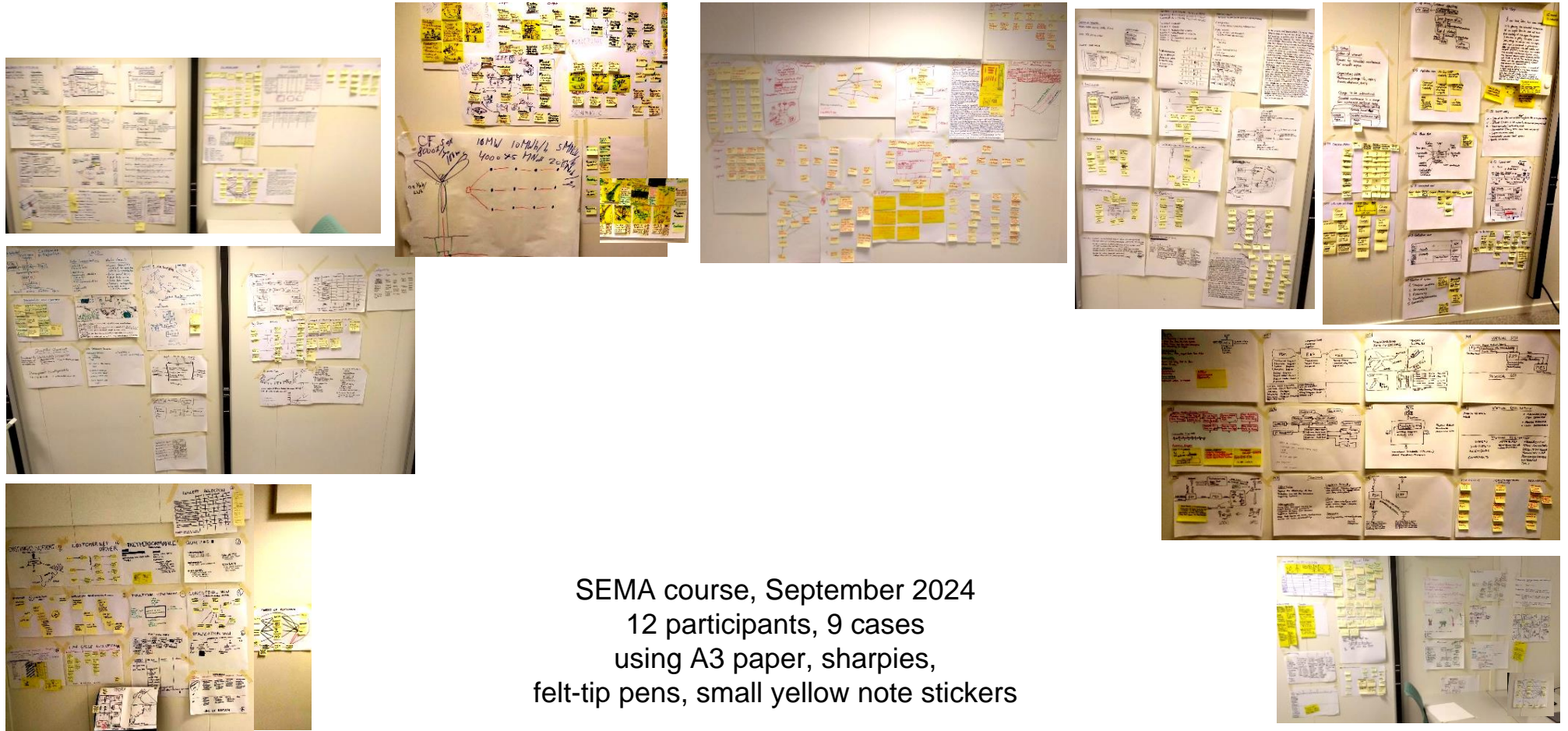
As preparation for the course I ask you the following:

- Look if the other participants are working on similar systems, such that you can work as team.
- Pick as team a system/component/function/project you will use during the course.
- For this system/component/function/project collect information about: who is the customer, what does the customer need, how is the system used, what technologies are used in the system, what are the main technological challenges et cetera. You do not have to be an expert when you come to the course, but you need to have some feeling for the system you will be working on during the course and presumably also in the 10 week project.
- If you are preparing your master project, then the master project case is probably a good option. This will boost your master project.

Assignments during the Course



The Classroom After the Assignments



SEMA course, September 2024
12 participants, 9 cases
using A3 paper, sharpies,
felt-tip pens, small yellow note stickers

Course Material Introduction

core

SEMA System Modeling and Analysis Course

<http://www.gaudisite.nl/info/SEMACourse.info.html>

SEMA Basic Philosophy

<http://www.gaudisite.nl/info/SEMAbasics.info.html>

Physical Models of an Elevator

<http://www.gaudisite.nl/info/ElevatorPhysicalModel.info.html>

optional

Teaching conceptual modeling at multiple system levels using multiple views

http://www.gaudisite.nl/CIRP2014_Muller_TeachingConceptualModeling.pdf

Understanding the human factor by making understandable visualizations

<http://www.gaudisite.nl/info/UnderstandingHumanFactorVisualizations.info.html>

Dynamic Range of Abstraction Levels in Architecting

<http://www.gaudisite.nl/info/DynamicRangeAbstractionLevels.info.html>

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SEMA Method Overview

<http://www.gaudisite.nl/info/SEMAmethodOverviewSlides.pdf>

Short introduction to basic "CAFCR" model

<http://www.gaudisite.nl/info/BasicCAFCR.info.html>

InitialCAFCRscan

<http://www.gaudisite.nl/info/InitialCAFCRscan.info.html>

optional

Architectural Reasoning Explained

<http://www.gaudisite.nl/ArchitecturalReasoningBook.pdf>

Architectural Reasoning

<http://www.gaudisite.nl/ArchitecturalReasoning.html>

Iteration How To

<http://www.gaudisite.nl/info/IterationHowTo.info.html>

Modeling and Analysis: Iteration and Time-boxing

<http://www.gaudisite.nl/info/MAiterationAndTimeboxing.info.html>

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Story How To

<http://www.gaudisite.nl/info/StoryHowTo.info.html>

Use Case How To

<http://www.gaudisite.nl/info/UseCases.info.html>

optional

Story Telling in Medical Imaging

<http://www.gaudisite.nl/info/MIstories.info.html>

Course Material Design Fundamentals

core

System Partitioning Fundamentals

<http://www.gaudisite.nl/info/SystemPartitioningFundamentals.info.html>

optional

Basic Working Methods of a System Architect

<http://www.gaudisite.nl/info/BasicWorkingMethodArchitect.info.html>

SubSea Modeling Example

<http://www.gaudisite.nl/SubSeaModelingExampleSlides.pdf>

Course Material Customer Space Analysis

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Methods to Explore the Customer Perspective

<http://www.gaudisite.nl/info/MethodsToExploreTheCustomerPerspective.info.html>

Key Drivers How To

<http://www.gaudisite.nl/info/KeyDriversHowTo.info.html>

optional

Medical Imaging Workstation: CAF Views

<http://www.gaudisite.nl/info/MIviewsCAF.info.html>

Course Material Conceptual Design

core

Modeling and Analysis: Budgeting

<http://www.gaudisite.nl/info/MAbudgeting.info.html>

Concept Selection, Set Based Design and Late Decision Making

<http://www.gaudisite.nl/info/ConceptSelectionSetBased.info.html>

optional

The Tool Box of the System Architect

<http://www.gaudisite.nl/info/ToolBoxSystemArchitect.info.html>

Course Material Business and Life Cycle

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Simplistic Financial Computations for System Architects.

<http://www.gaudisite.nl/info/SimplisticFinancialComputations.info.html>

Modeling and Analysis: Life Cycle Models

<http://www.gaudisite.nl/info/MAlifeCycle.info.html>

optional

How to present architecture issues to higher management

<http://www.gaudisite.nl/info/ArchitectManagementInteraction.info.html>

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Qualities as Integrating Needles

<http://www.gaudisite.nl/info/QualityNeedles.info.html>

Threads of Reasoning

<http://www.gaudisite.nl/info/ThreadsOfReasoning.info.html>

Threads of reasoning illustrated by medical imaging case

<http://www.gaudisite.nl/PresentationMITORSlides.pdf>

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Modeling and Analysis: Reasoning Approach

<http://www.gaudisite.nl/info/MAreasoningApproach.info.html>

Modeling and Analysis: Analysis

<http://www.gaudisite.nl/info/MAanalysis.info.html>

optional

Modeling and Analysis: Measuring

<http://www.gaudisite.nl/info/MAMEasuring.info.html>

ASP Python Exercise

<http://www.gaudisite.nl/info/ASPpythonExercise.info.html>

Course Material Wrap-up

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Consolidating Architecture Overviews

<http://www.gaudisite.nl/info/ConsolidatingArchitectureOverviewsSlides.pdf>

SEMA Homework Assignment

<http://www.gaudisite.nl/info/SEMAhomeworkAssignmentSlides.pdf>

optional

Guidelines for Visualization

<http://www.gaudisite.nl/info/VisualizationGuidelines.info.html>

Granularity of Documentation

<http://www.gaudisite.nl/info/DocumentationGranularity.info.html>

Light Weight Review Process

<http://www.gaudisite.nl/info/LightWeightReview.info.html>

Cookbook A3 Architecture Overview *by Daniel Borches*

<http://www.gaudisite.nl/BorchesCookbookA3architectureOverview.pdf>

How to Create an Architecture Overview

<http://www.gaudisite.nl/info/OverviewHowTo.info.html>