

Module 31, Architectural Reasoning Case Exploration

by *Gerrit Muller* HBV-NISE

e-mail: gaudisite@gmail.com

www.gaudisite.nl

Abstract

This module introduces the case exploration used in the course Architectural Reasoning using Conceptual Modeling.

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.

October 3, 2016

status: preliminary

draft

version: 1.0

SEMA Methods Overview

by *Gerrit Muller* HBV-NISE

e-mail: gaudisite@gmail.com

www.gaudisite.nl

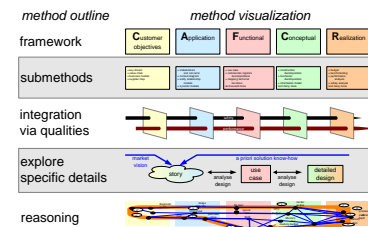
Abstract

This presentation provides an overview of the SEMA course: 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.

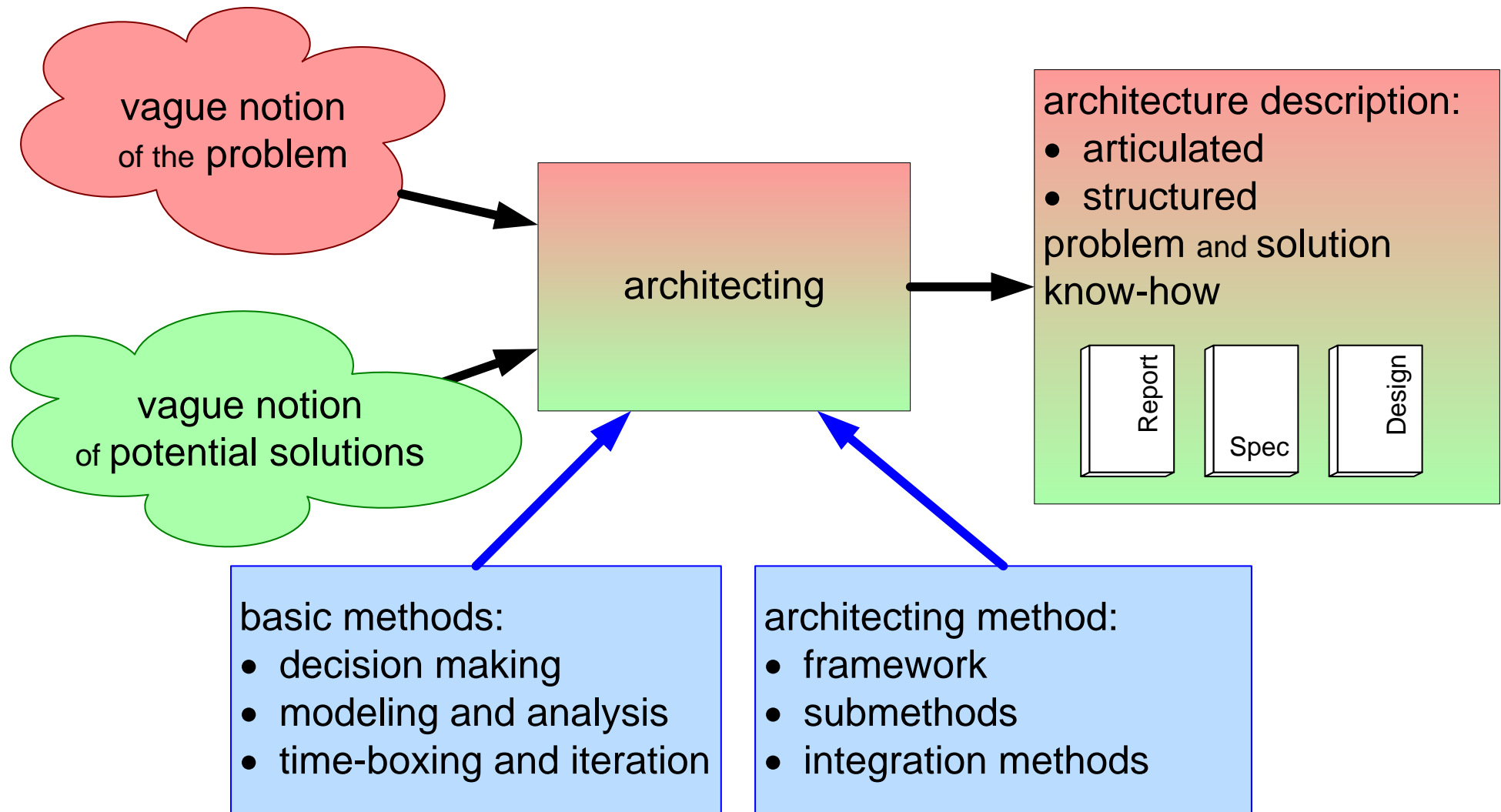
Distribution

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.

October 3, 2016
status: preliminary
draft
version: 0



From vague notions to articulate and structured

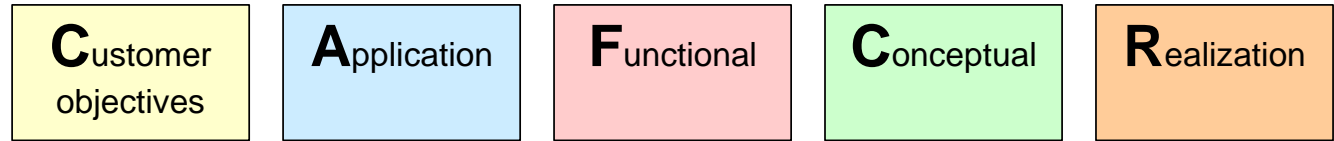


Overview of architecting method

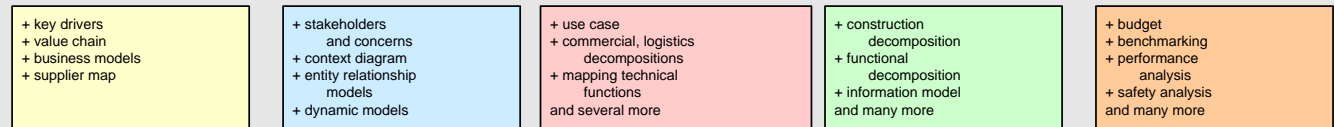
method outline

method visualization

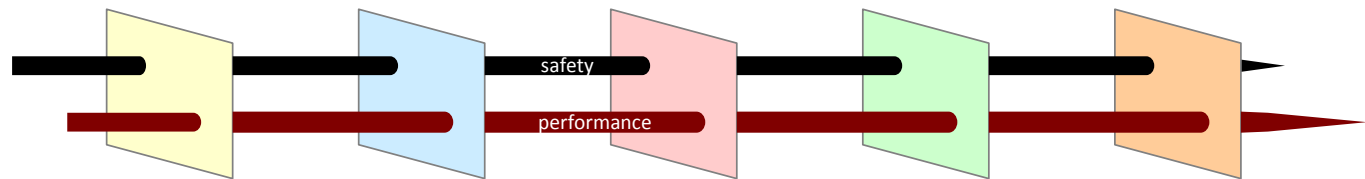
framework



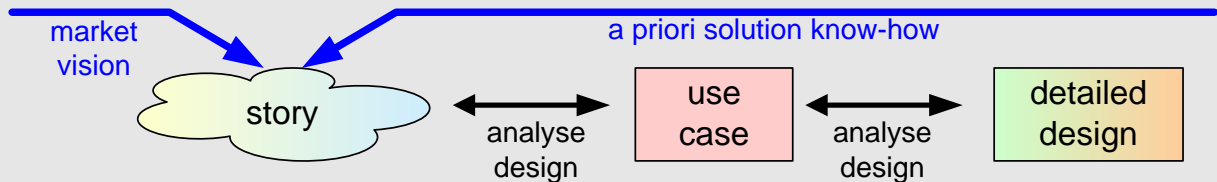
submethods



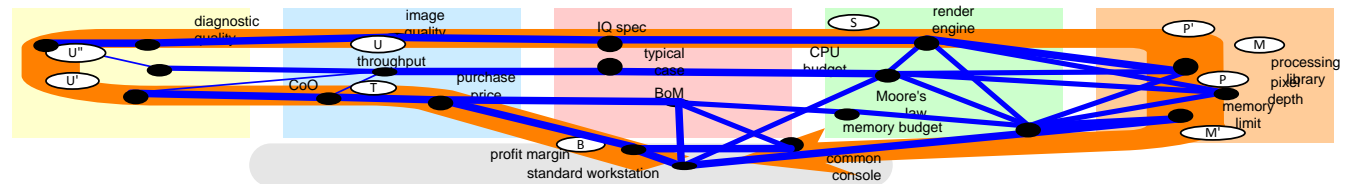
integration via qualities



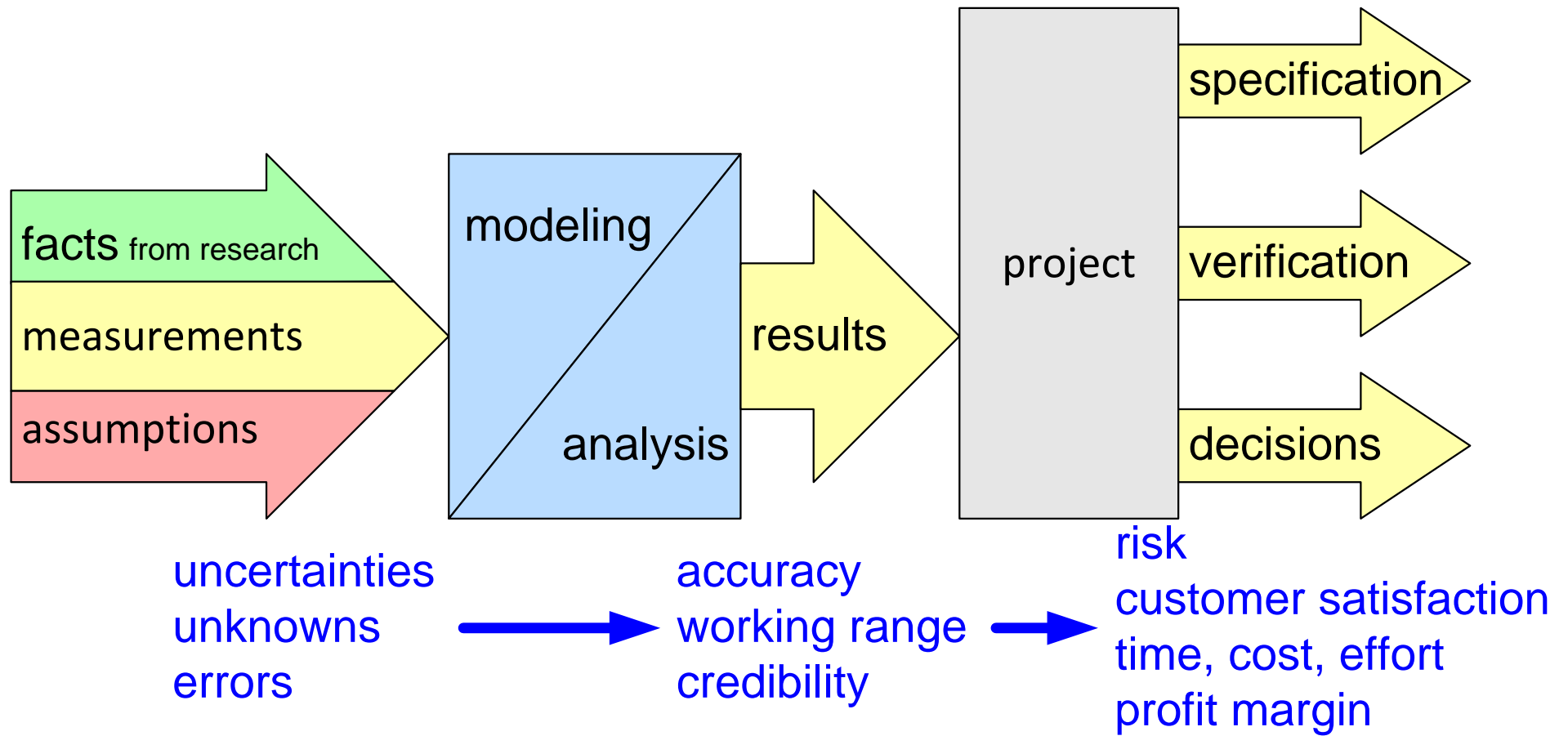
explore specific details



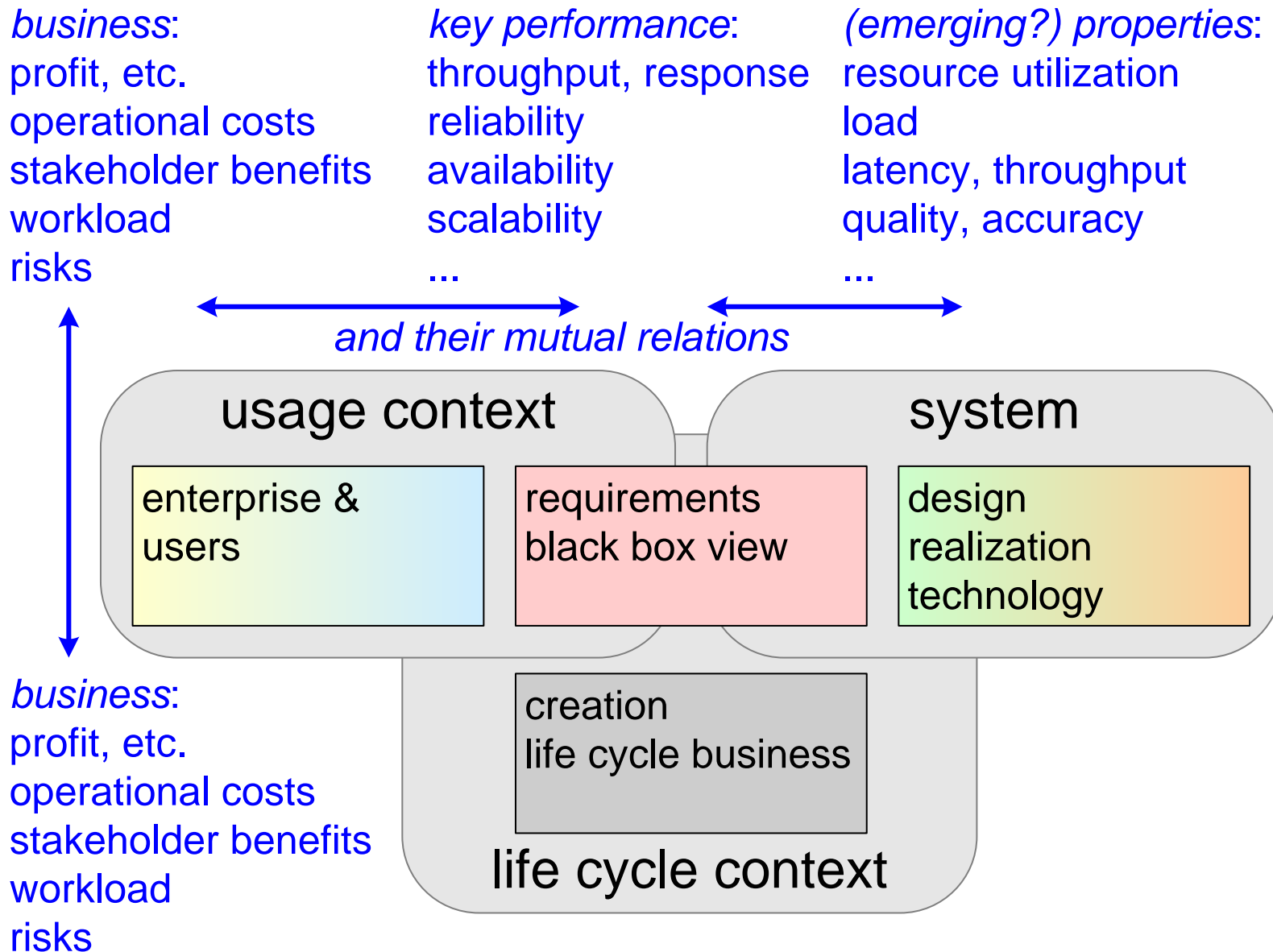
reasoning



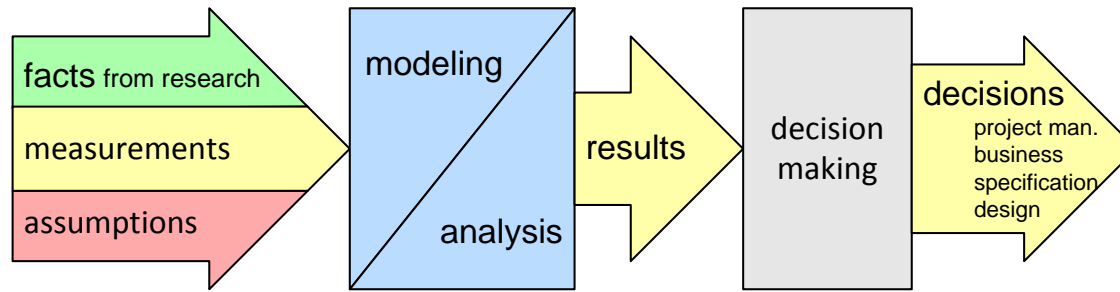
Purpose of Modeling



What to Model?

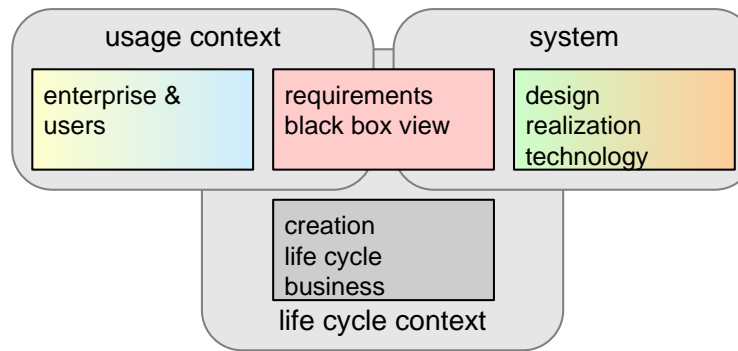


Overview of Modeling Approach



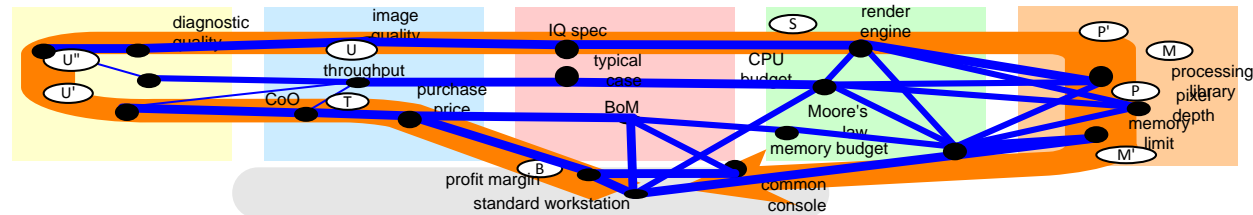
collect input data

model and analyse relevant issues



for different stakeholders & concerns

integration and reasoning



Short introduction to basic “CAFCR” model

by *Gerrit Muller* Buskerud University College

e-mail: gaudisite@gmail.com

www.gaudisite.nl

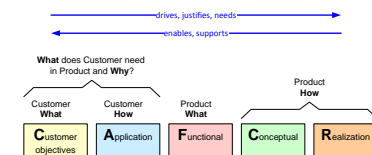
Abstract

The basic “CAFCR” reference model is described, which is used to describe a system in relation to its context. The main stakeholder in the context is the customer. The question “Who is the customer?” is addressed.

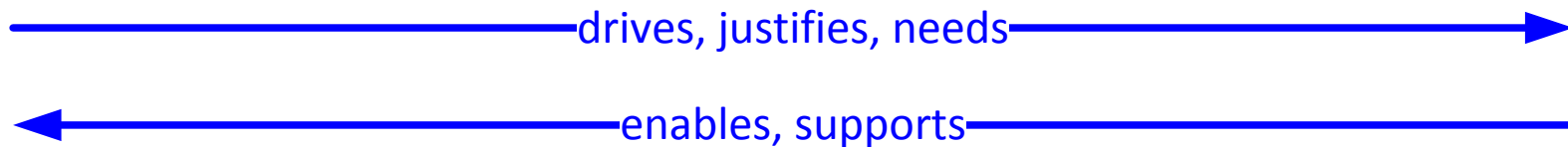
Distribution

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.

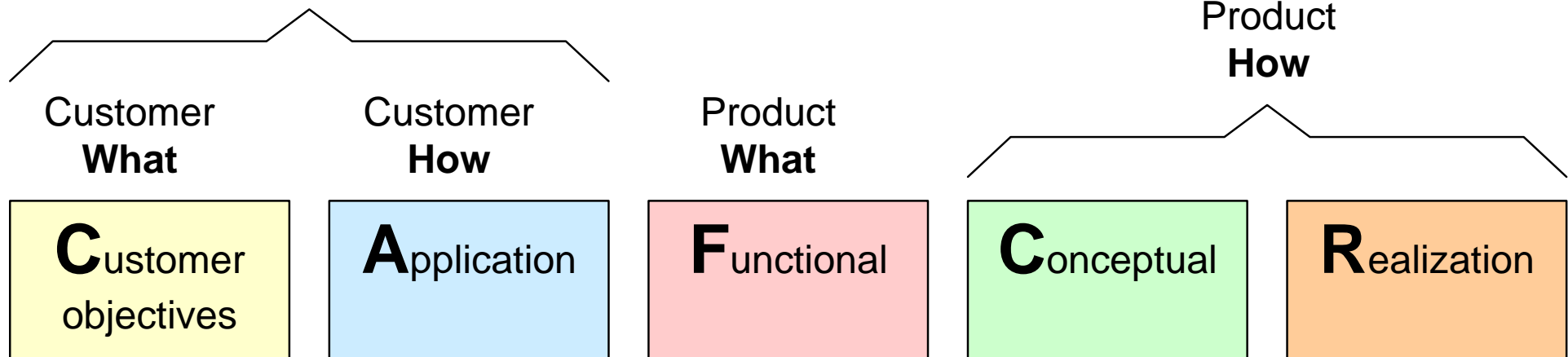
October 3, 2016
status: draft
version: 0.4



The “CAFCR” model

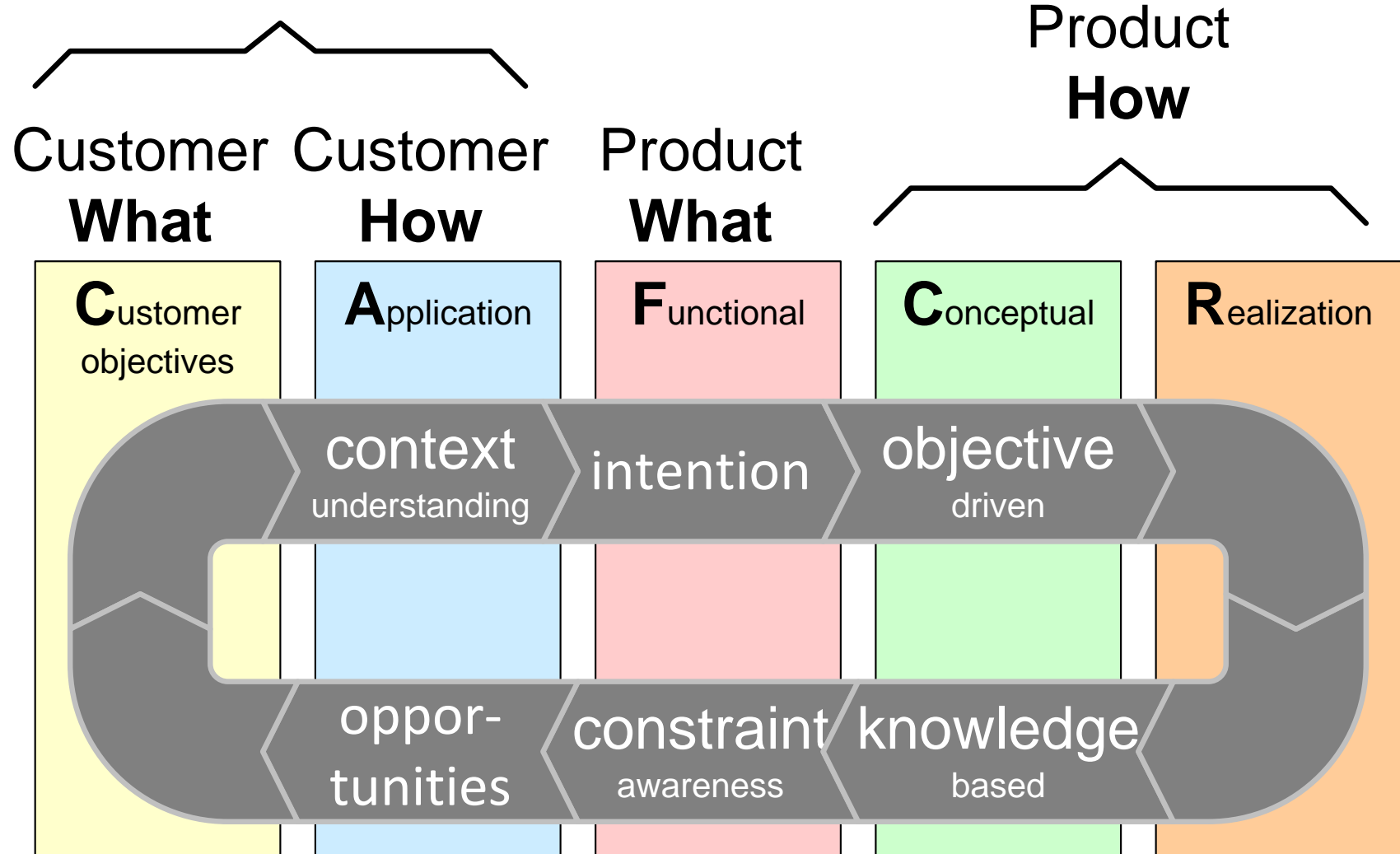


What does Customer need
in Product and **Why?**

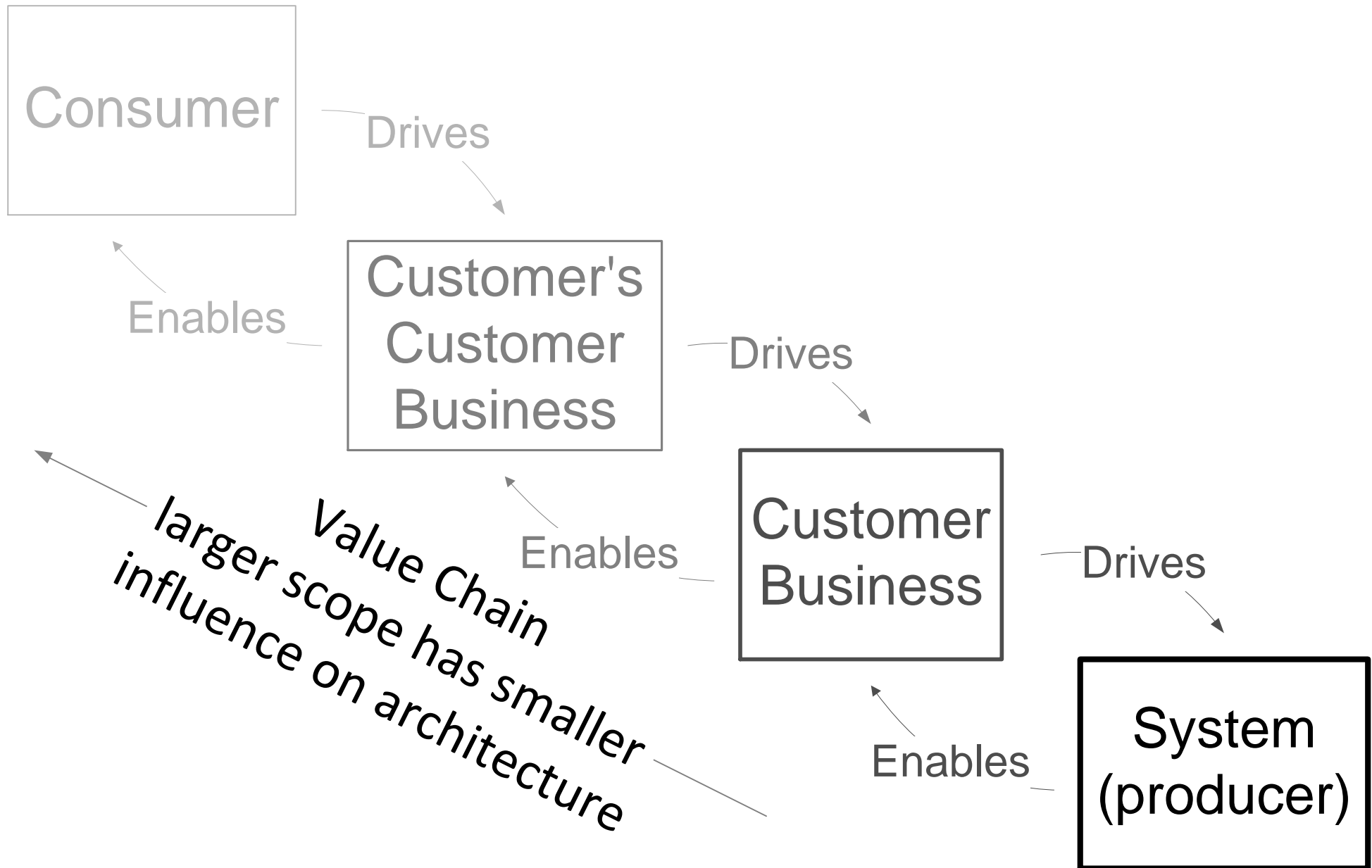


Integrating CAFCR

What does Customer need
in Product and **Why?**



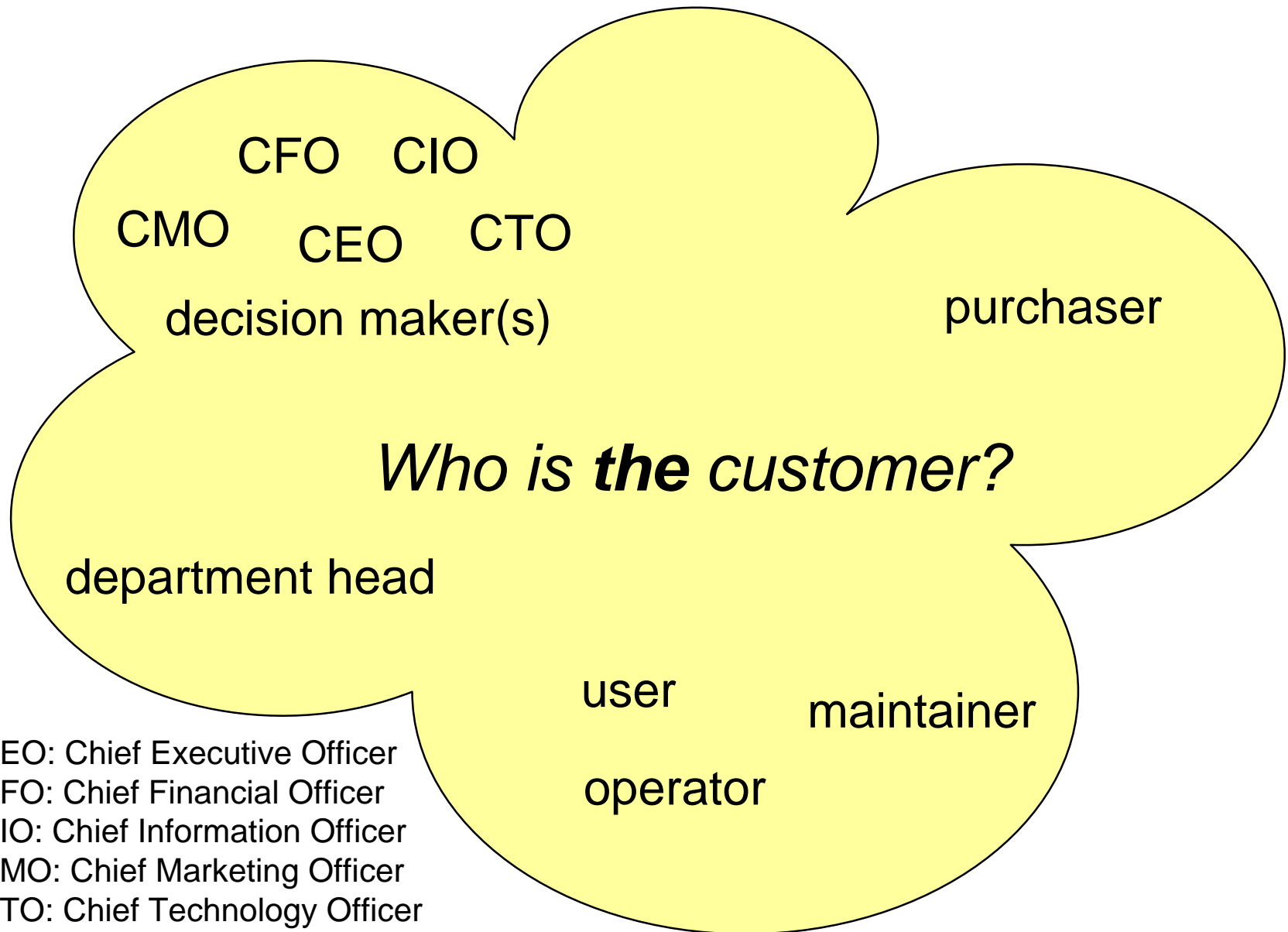
CAFCR can be applied recursively



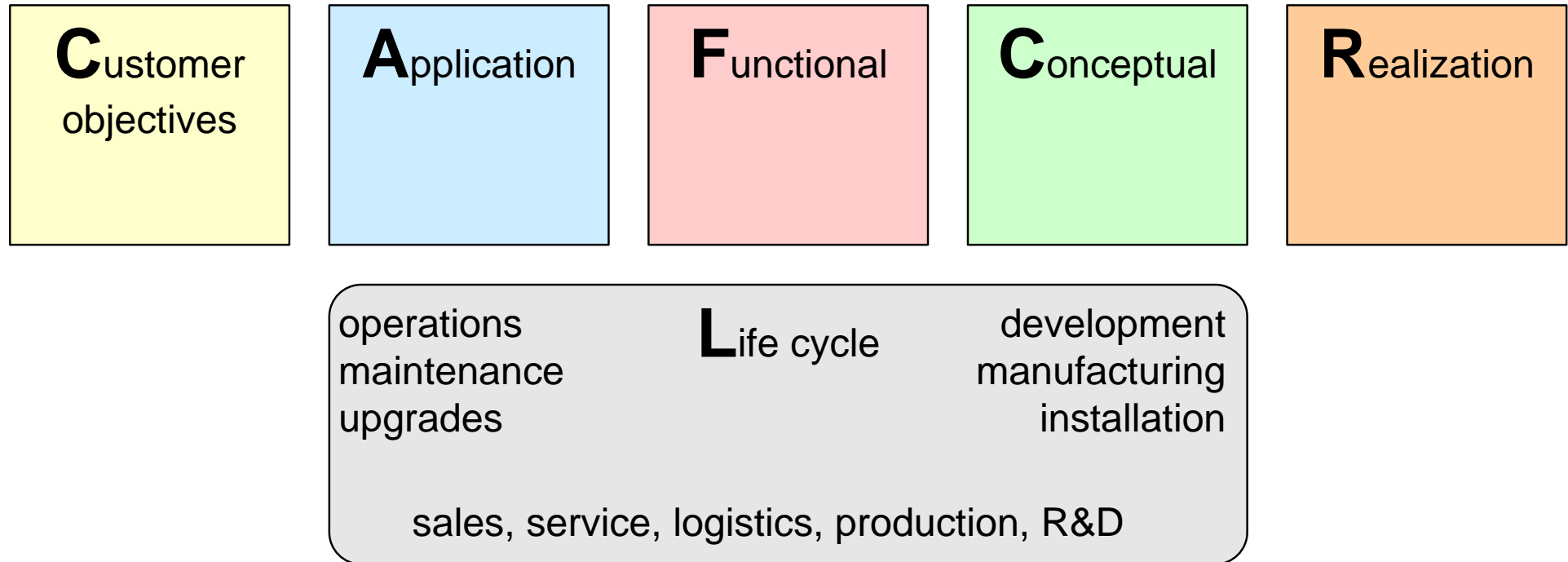
Market segmentation

segmentation axis	examples
geographical	USA, UK, Germany, Japan, China
business model	profit, non profit
economics	high end versus cost constrained
consumers	youth, elderly
outlet	retailer, provider, OEM, consumer direct

Example of a small buying organization



CAFCR+ model; Life Cycle View



Initial CAFCR scan

by *Gerrit Muller* HBV-NISE

e-mail: `gaudisite@gmail.com`

`www.gaudisite.nl`

Abstract

This presentation guides a team through a quick CAFCR scan. Such quick scan with typically 15 minutes per view helps to build an initial overview of the problem and solution space.

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.

October 3, 2016
status: preliminary
draft
version: 0.3

make a bottom-up analysis of your product:

1. realization
2. conceptual
3. functional
4. application
5. customer objectives
6. qualities

use time boxes of 15 minutes per view
show the most dominant decomposition of that view, as diagram or as a list; some more guidance will be given per step.

Exercise Bottom-up Scan CAFCR

make a bottom-up analysis of your product:

1. realization
2. conceptual
3. functional
4. application
5. customer objectives
6. qualities

use time boxes of 15 minutes per view

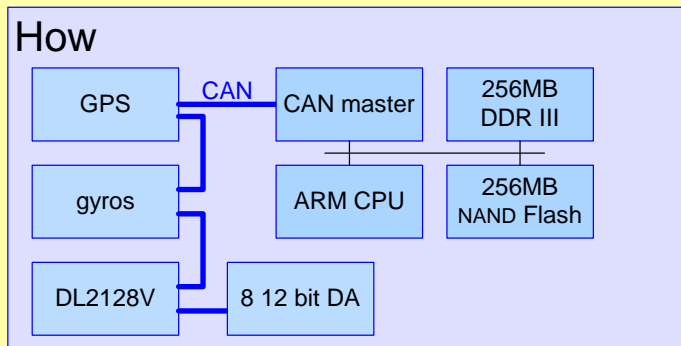
show the most dominant decomposition of that view, as diagram or as a list; some more guidance will be given per step.

Do and Don't

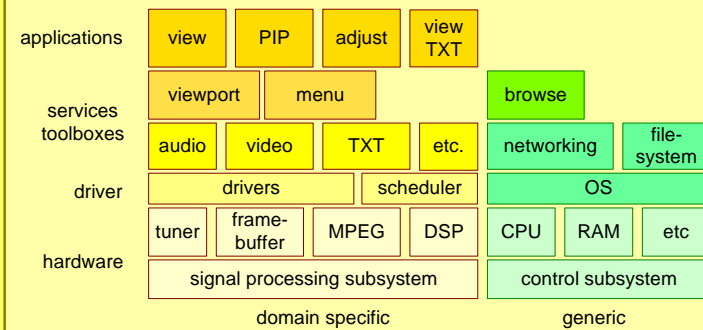
Do	Do not	Because
<ul style="list-style-type: none">• start sketching/drawing as soon as possible• use shared large sheets of paper (e.g. flip-over)• number the flip-overs and add a title• annotate (add notes) during discussions• use yellow note stickers and flip-over markers• be open for ideas and surprises	<ul style="list-style-type: none">• write long texts• immediately capture electronic• have nice but volatile discussions• write with pen or pencil• Do not stick to the first solution	<ul style="list-style-type: none">• sketches stimulate sharing and discussion• sharing and discussion help to explore faster• remembering the order gets challenging• information and insight is quickly lost• stickers are easily (re)moved• you hopefully discover a lot; increased insight will change problem and solution

Step 1: Realization View

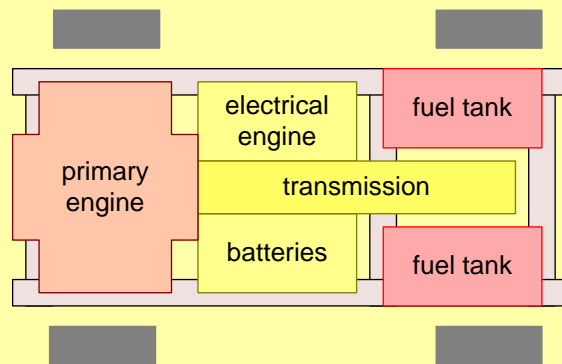
Choose 1 or 2 items from below



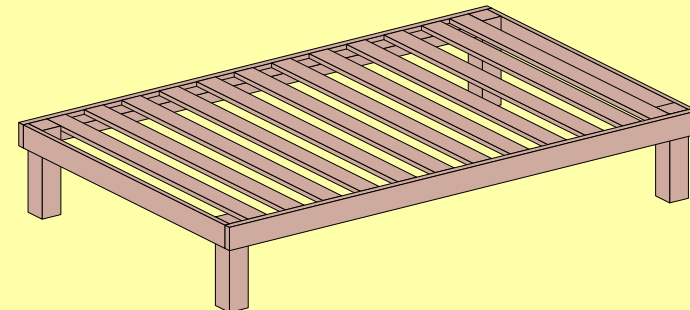
HW block diagram



SW layer diagram



2D layout of system internals



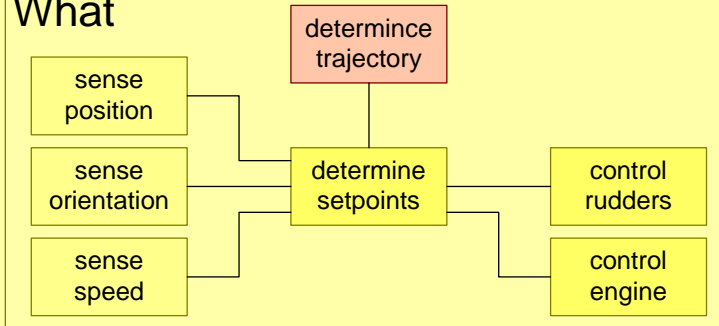
3D sketch of system internals

Annotate/mark most critical technologies or characteristics

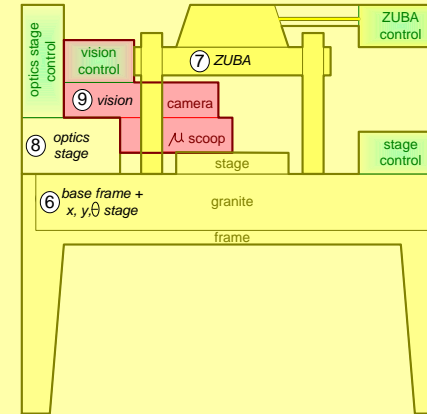
Step 2: Conceptual View

Chose 1 or 2 items from below

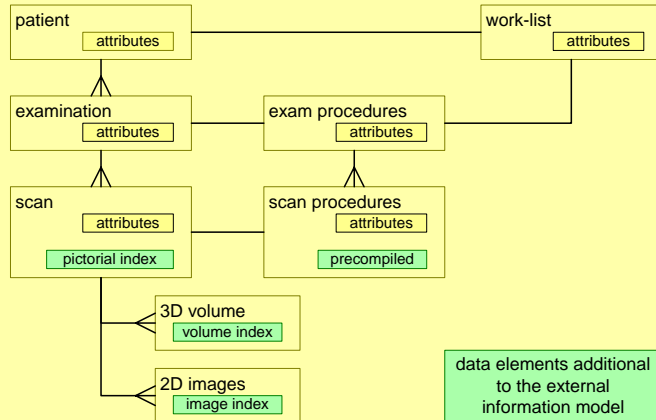
What



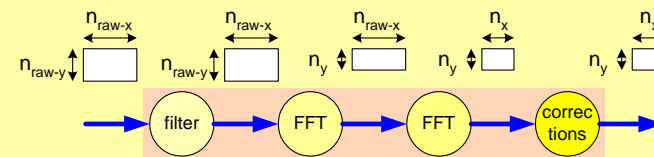
functional model



subsystem decomposition



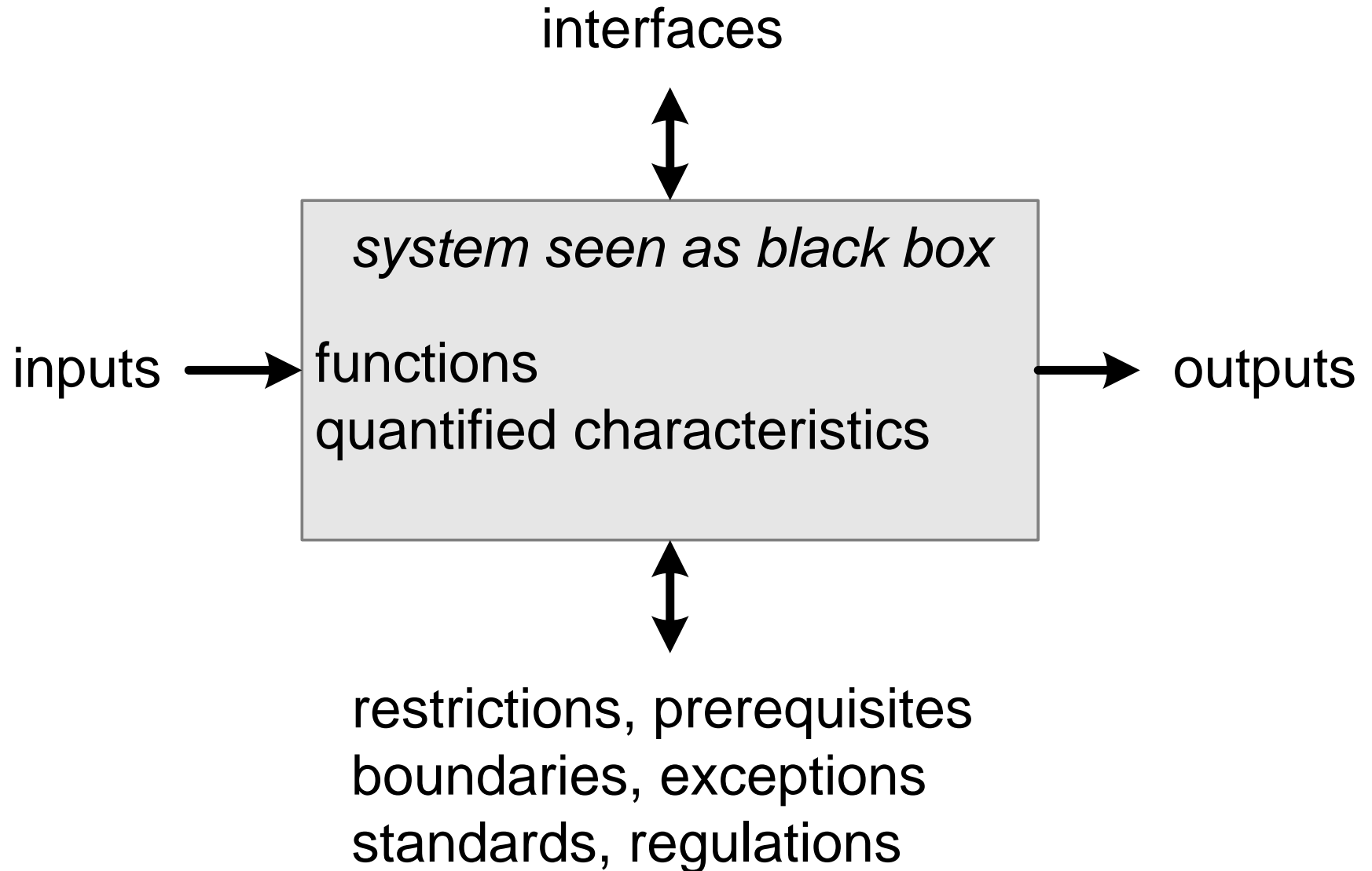
information model



$$\begin{aligned}
 t_{recon} &= t_{filter}(n_{raw-x}, n_{raw-y}) + \\
 & n_{raw-x} * (t_{fft}(n_{raw-y}) + t_{col-overhead}) + \\
 & n_y * (t_{fft}(n_{raw-x}) + t_{row-overhead}) + \\
 & t_{corrections}(n_x, n_y) + \\
 & t_{control-overhead} \\
 t_{fft}(n) &= c_{fft} * n * \log(n)
 \end{aligned}$$

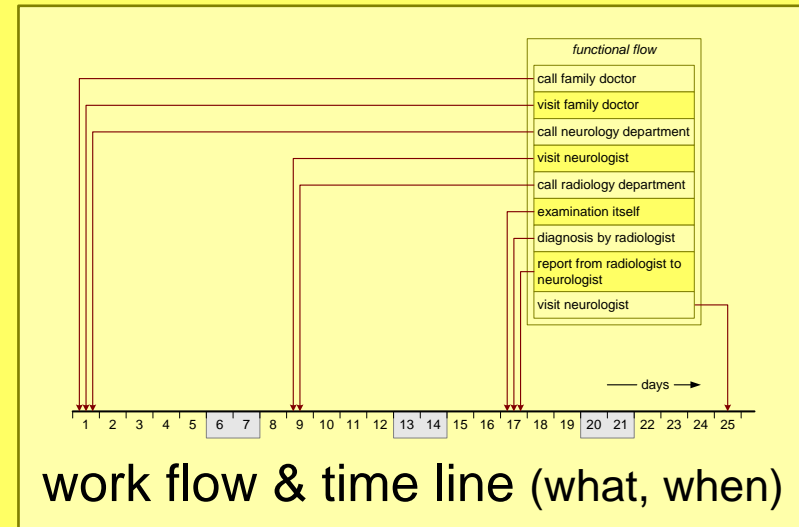
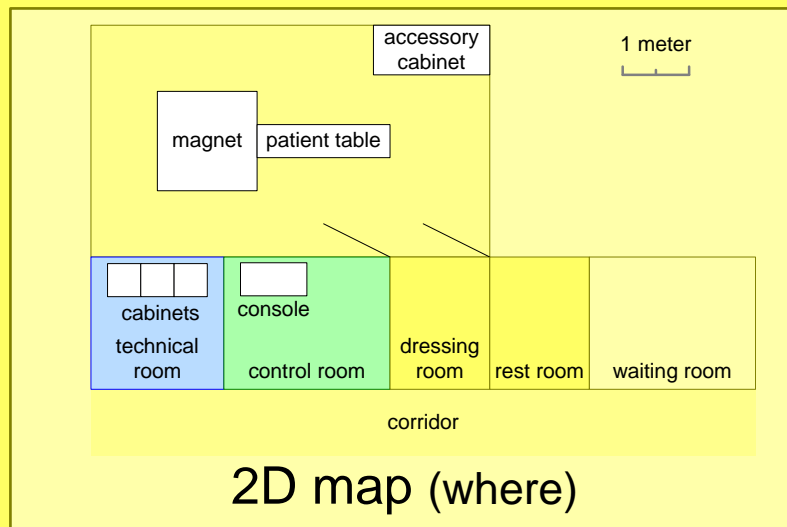
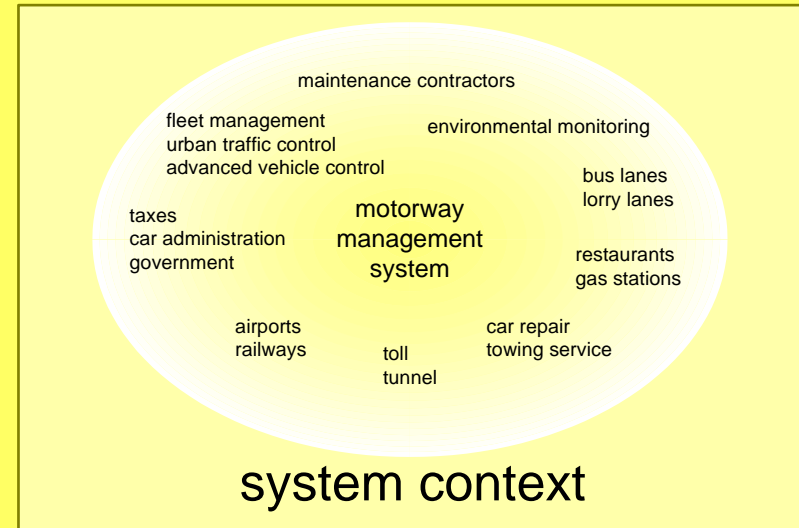
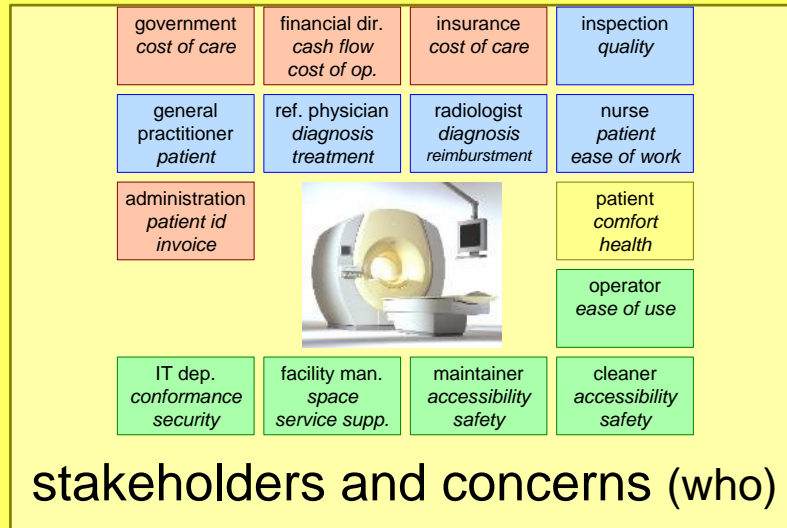
performance model

Step 3: Functional View; Top level Spec

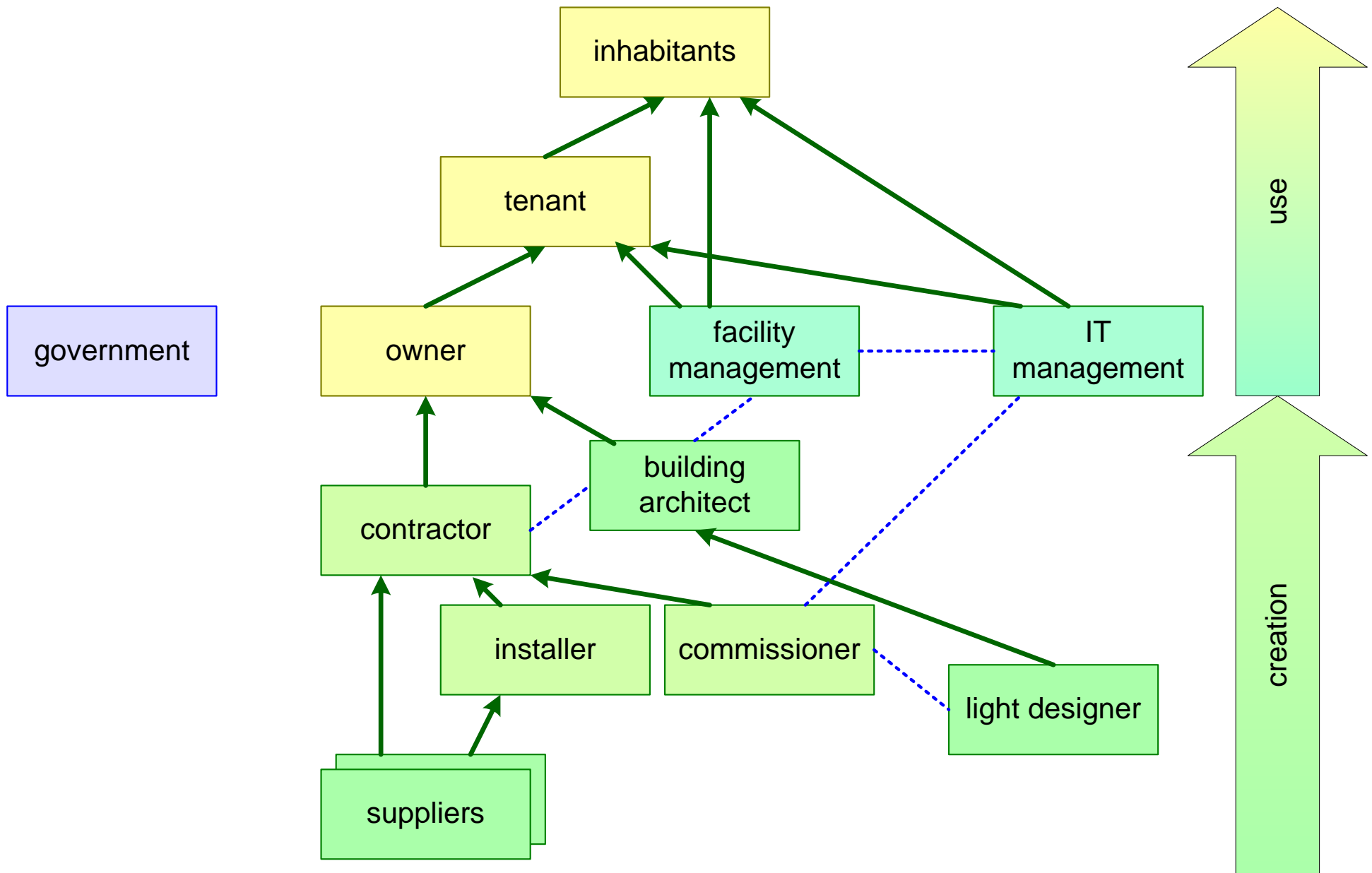


Step 4: Application View

Chose 1 or 2 items from below



Step 5: Customer Objectives View; Value Network



Step 6: Qualities

usable

usability
attractiveness
responsiveness
image quality
wearability
storability
transportability

dependable

safety
security
reliability
robustness
integrity
availability

effective

throughput or
productivity

interoperable

connectivity
3rd party extendible

liable

liability
testability
traceability
standards compliance

efficient

resource utilization
cost of ownership

consistent

reproducibility
predictability

serviceable

serviceability
configurability
installability

future proof

evolvability
portability
upgradeability
extendibility
maintainability

logistics friendly

manufacturability
logistics flexibility
lead time

ecological

ecological footprint
contamination
noise
disposability

down to earth attributes

cost price
power consumption
consumption rate
(water, air,
chemicals,
et cetera)
size, weight
accuracy

Presentation

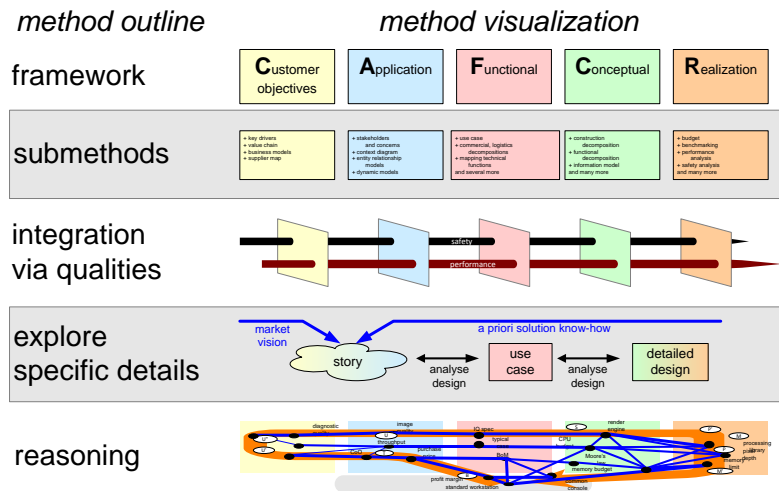
Present the results top-down

Use two to three flip charts of the six that have been created.

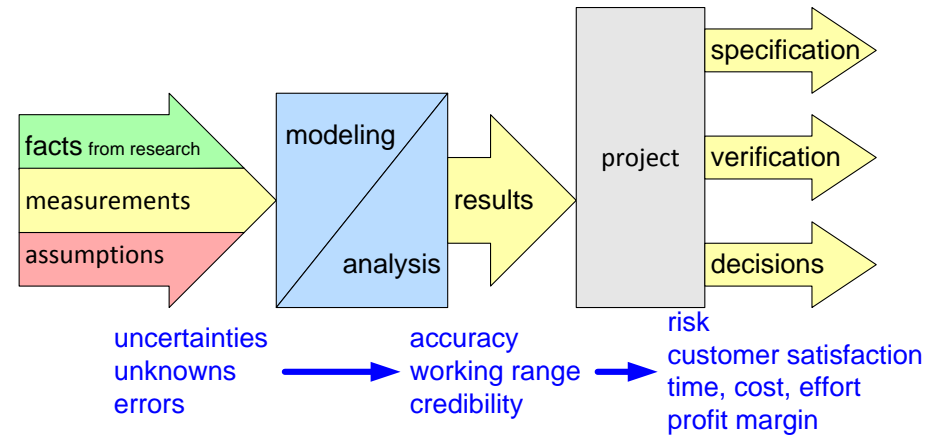
Explain in five minutes the needs of the customer, the system, and the major design choices.

Method Overview

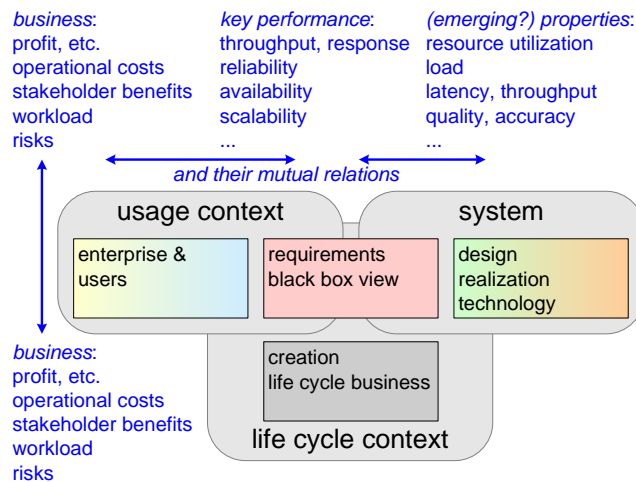
Architecting Method Overview



Modeling Method Overview

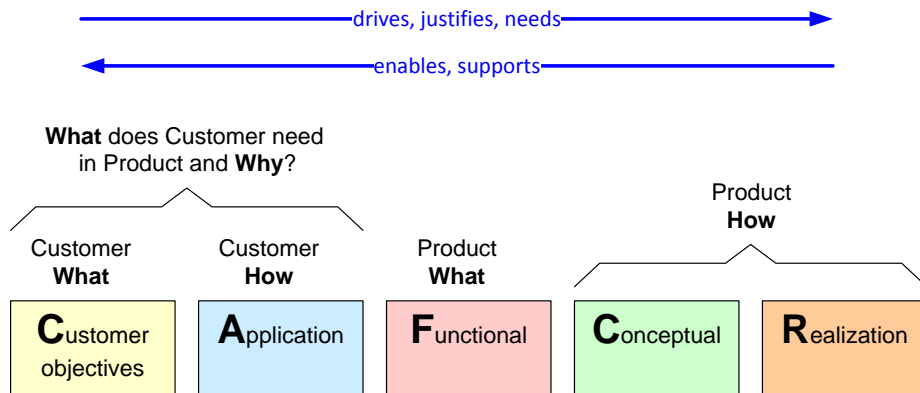


Modeling Scope

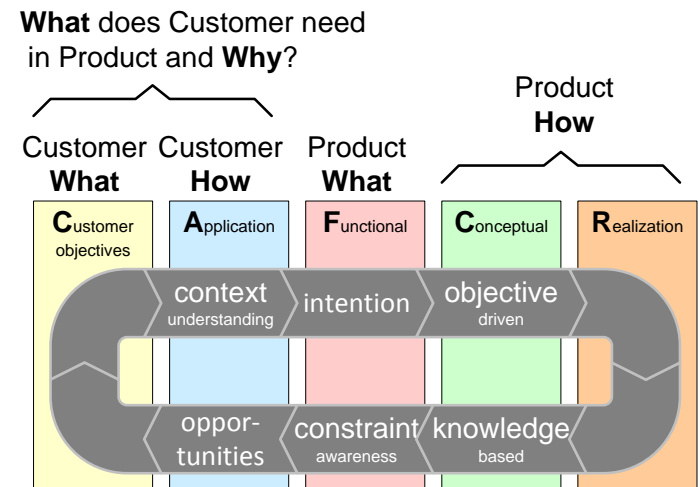


intentionally left blank

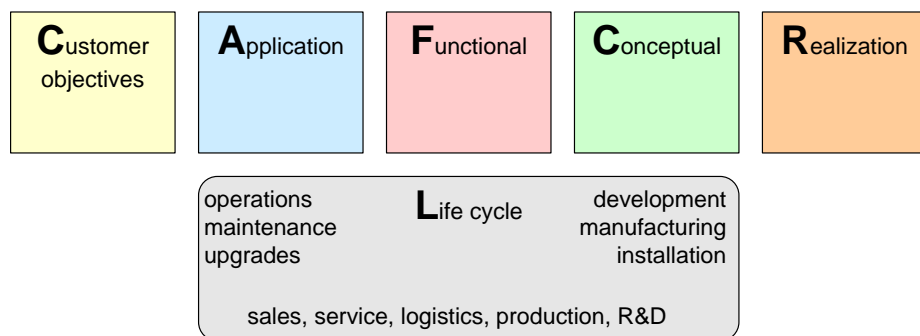
CAFCR views



Integrate and Iterate



Plus Life Cycle view



Sketch on Flips, Use Note stickers

Do	Do not	Because
<ul style="list-style-type: none"> start sketching/drawing as soon as possible use shared large sheets of paper (e.g. flip-over) number the flip-overs and add a title annotate (add notes) during discussions use yellow note stickers and flip-over markers be open for ideas and surprises 	<ul style="list-style-type: none"> write long texts immediately capture electronic have nice but volatile discussions write with pen or pencil Do not stick to the first solution 	<ul style="list-style-type: none"> sketches stimulate sharing and discussion sharing and discussion help to explore faster remembering the order gets challenging information and insight is quickly lost stickers are easily (re)moved you hopefully discover a lot; increased insight will change problem and solution