Eliciting and Validating Stakeholder Needs

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Abstract

A successful system offers value to the customer, and serves the needs of its stakeholders. To create a successful system we need to understand our stakeholders. However, success is also impacted by the way we realize the system. Poor realizations degrade the value of a product, while ingenious realizations can boost the value. We use the CAFCR+ model to illustrate this.

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version: 0

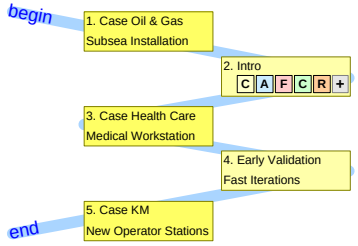
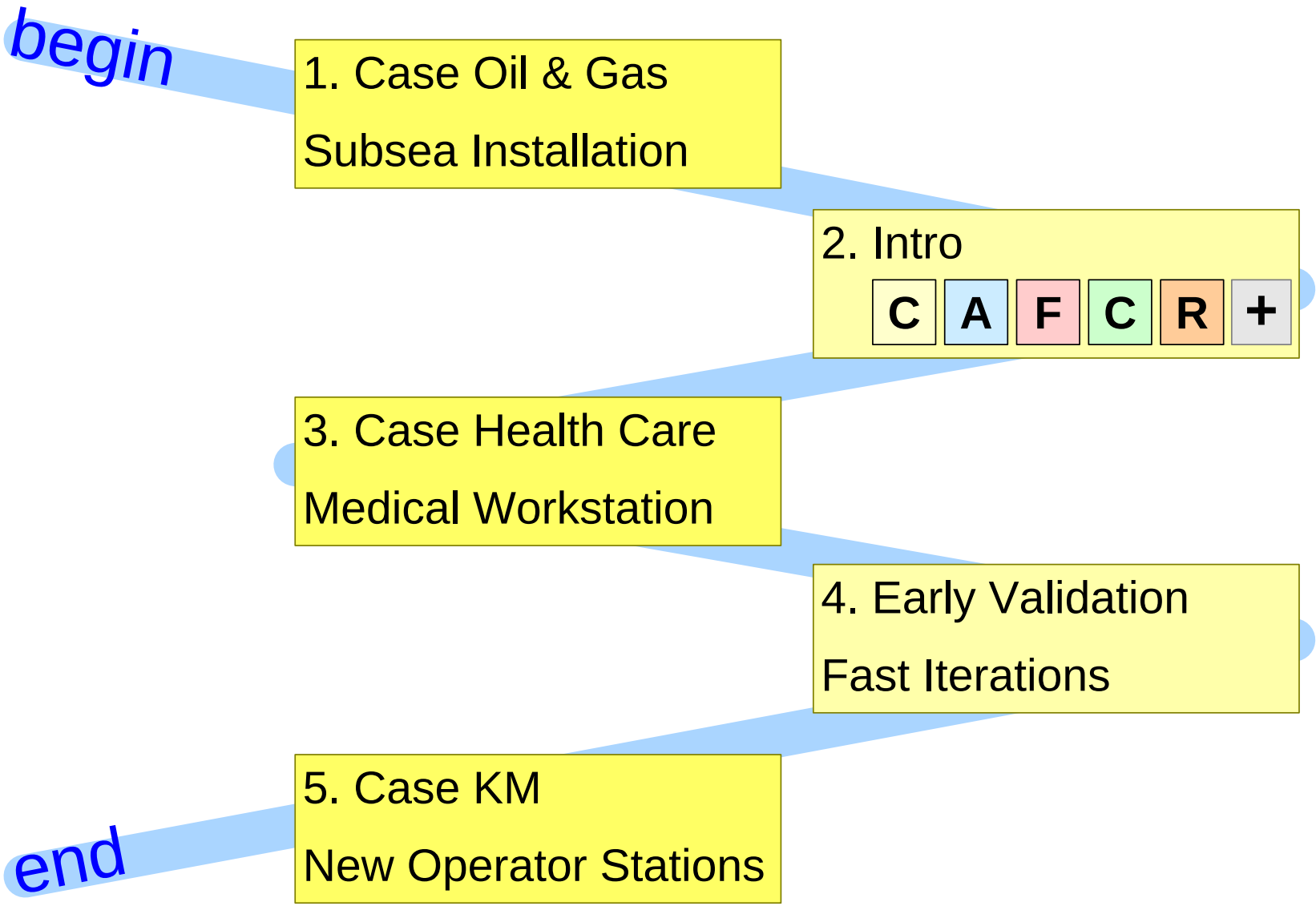


Figure Of Contents™



Early Phase Need Analysis -

Can We Ease Systems Integration?

Eldar Tranøy, Aker Solutions

- Large cost overruns on EPC projects on the Norwegian continental shelf
- 10 large EPC projects totaled a **96 GNoK cost overrun**
- Consistent trend with cost overruns from 1994 through 2008
- Main Cost Drivers: **Scope changes** and **late design changes**

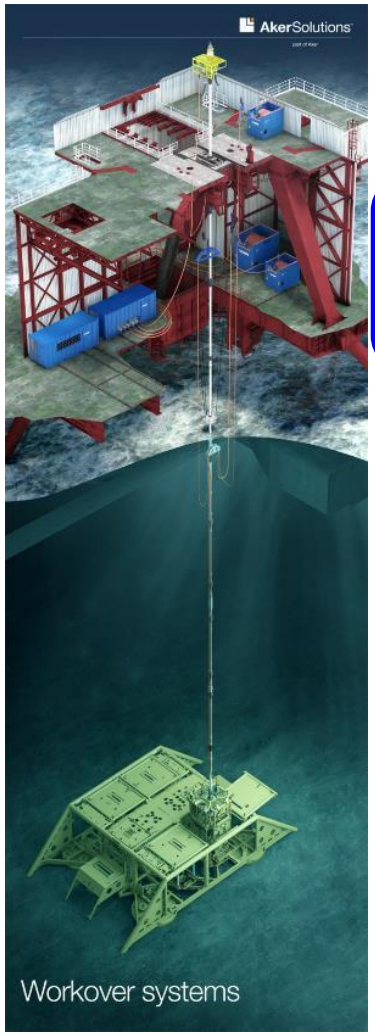
INCOSE 2014 Best Student Paper Award

Project	Estimated cost	Actual / New estimate	Change	Change in %
Balder	5	8,08	3,08	62
Gullfaks Sat 1	6,86	9	2,14	31
Jotun	6,2	7,2	1	16
Njord	6,31	7,76	1,45	23
Norne	8,62	9,27	0,65	8
Oseberg Sør	8,05	8,75	0,7	9
Oseberg Øst	3,49	4,3	0,81	23
Troll Gass	18,25	20,77	2,52	14
Varg	2,94	3,64	0,7	24
Visund	7,85	11,4	3,55	45
Åsgard	28,52	37	8,48	30
Kårstø	2,94	7,08	4,14	141
Åsgard Transport	7,36	7,96	0,6	8
Snøhvit LNG	43,8	64,5	20,7	47
Ormen Lange	72,5	107,1	34,6	48
Alvheim	8,7	17,2	8,5	98
Statfjord Seinfase	14,5	18,5	4	28
Blane	1,8	3,5	1,7	94
Valhall Re-dev	23,7	39,9	16,2	68
Gjøa (ink gaspipe)	30,2	34,7	4,5	15
Yme	4,7	8	3,3	70
Skarv	34,3	35,8	1,5	4
Vega + Vega Sør	6,4	7,5	1,1	17

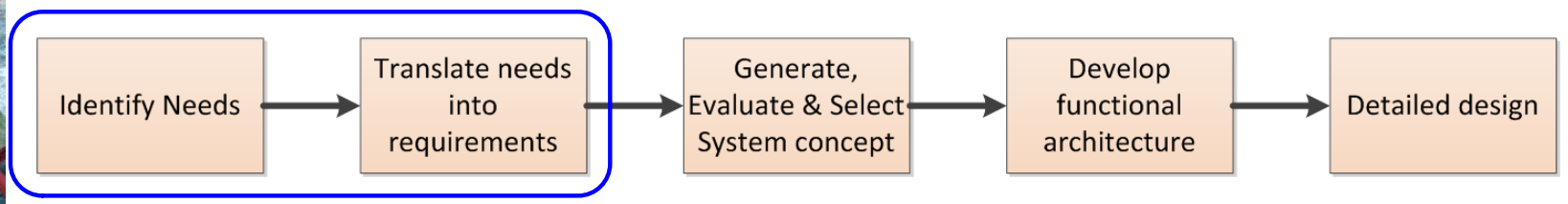
Numbers from the investment committee's report are all calculated as value pr. 1998

Eldar Tranøy Reduction of Late Design Changes Through Early Phase Need Analyis, INCOSE 2014 in Las Vegas, Brian Mar Award for best student paper
http://gaudisite.nl/INCOSE2014_Tran%C3%B8y_Muller_ReductionOfLateDesignChanges.pdf

Systems Engineering Benchmarking



- Systems Engineering Body of Knowledge (SEBoK)
- Fundamental SE process:



Example Project – Vigdis NE WOS

Amount of SE:

- **8,5% of total project cost**
- **Too low for optimum SEE**
- **High enough to expect good results**

Finding:

Mismatch between tendered design and **operational needs**

The design is **not suitable for the actual operational needs**

Examples of **typical missing data**:

- Meteorological and oceanographic data
- Field data
- Soil data
- Fluid data
- Installation vessel data

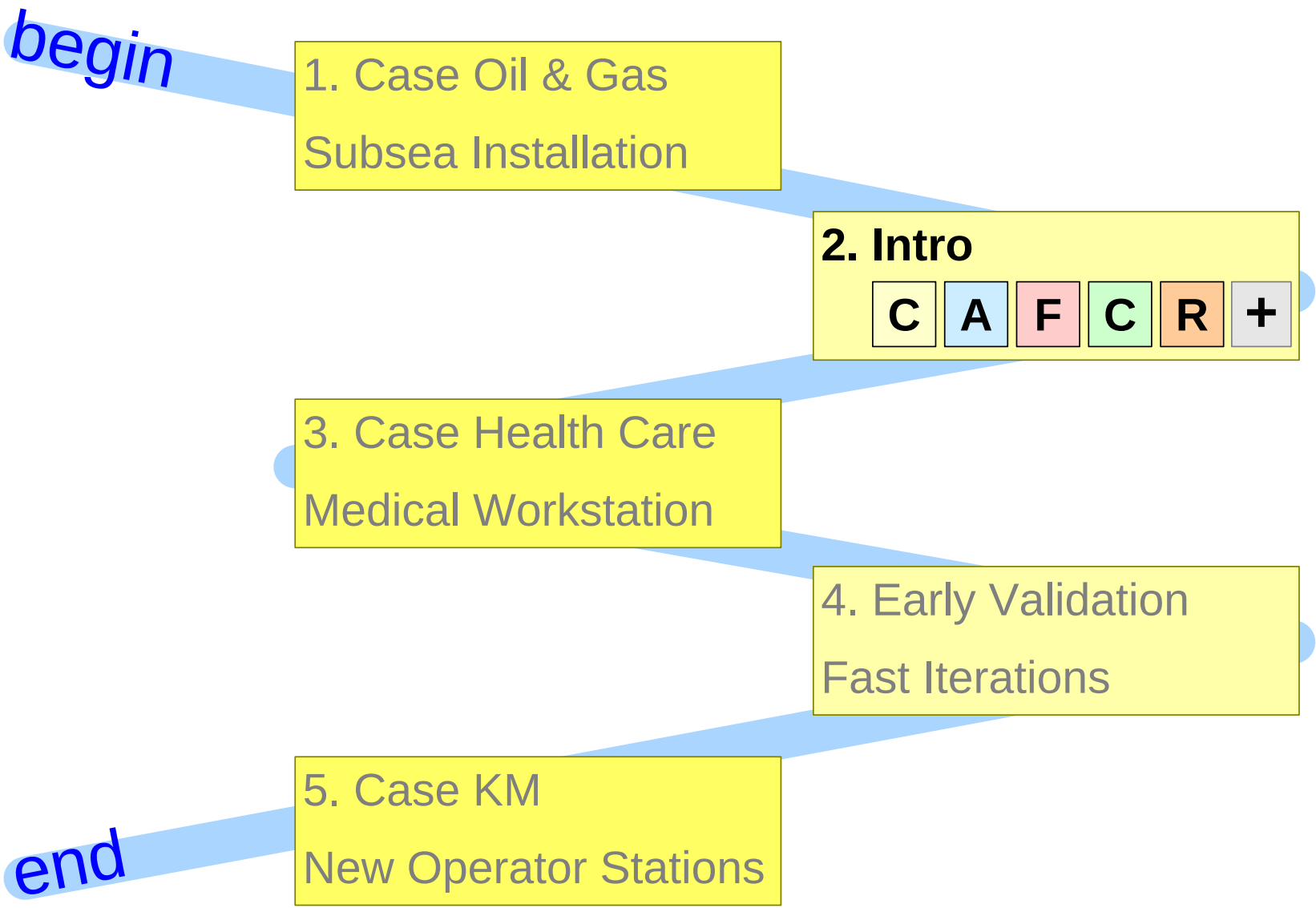
Analysis of Cost and Potential Impact

- Analysis of VO registry
  - Changes to design or scope normally results in a variation order (VO)
  - Cost of change is normally carried by customer
  - Review of 23 VO's

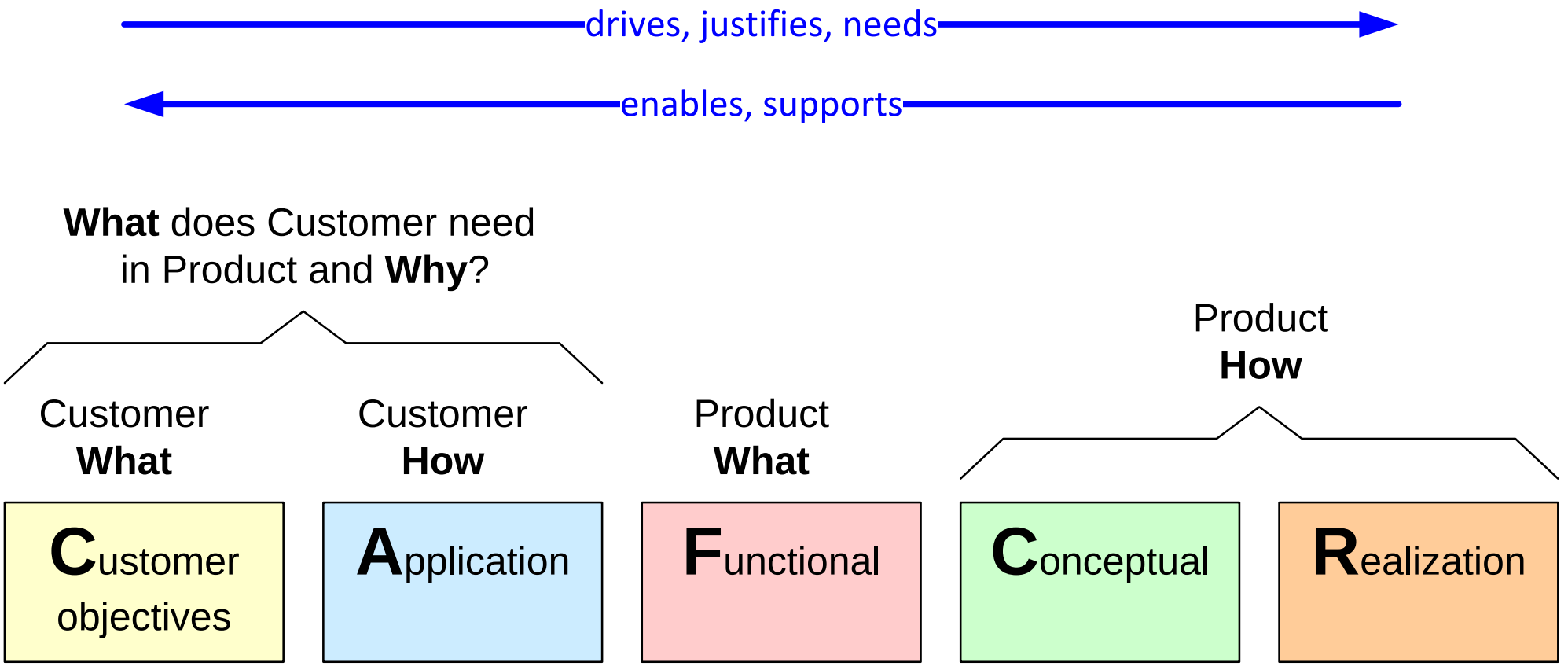
- **Findings**
  - **74% of the VO's were preventable by need analysis**
  - **92% of the cost incurred by late design changes, were preventable**

- **Root cause** analysis of the preventable VO's
  - Changes to product design
  - **Mismatches between project requirements and operational needs**

Introduction CAFCR+

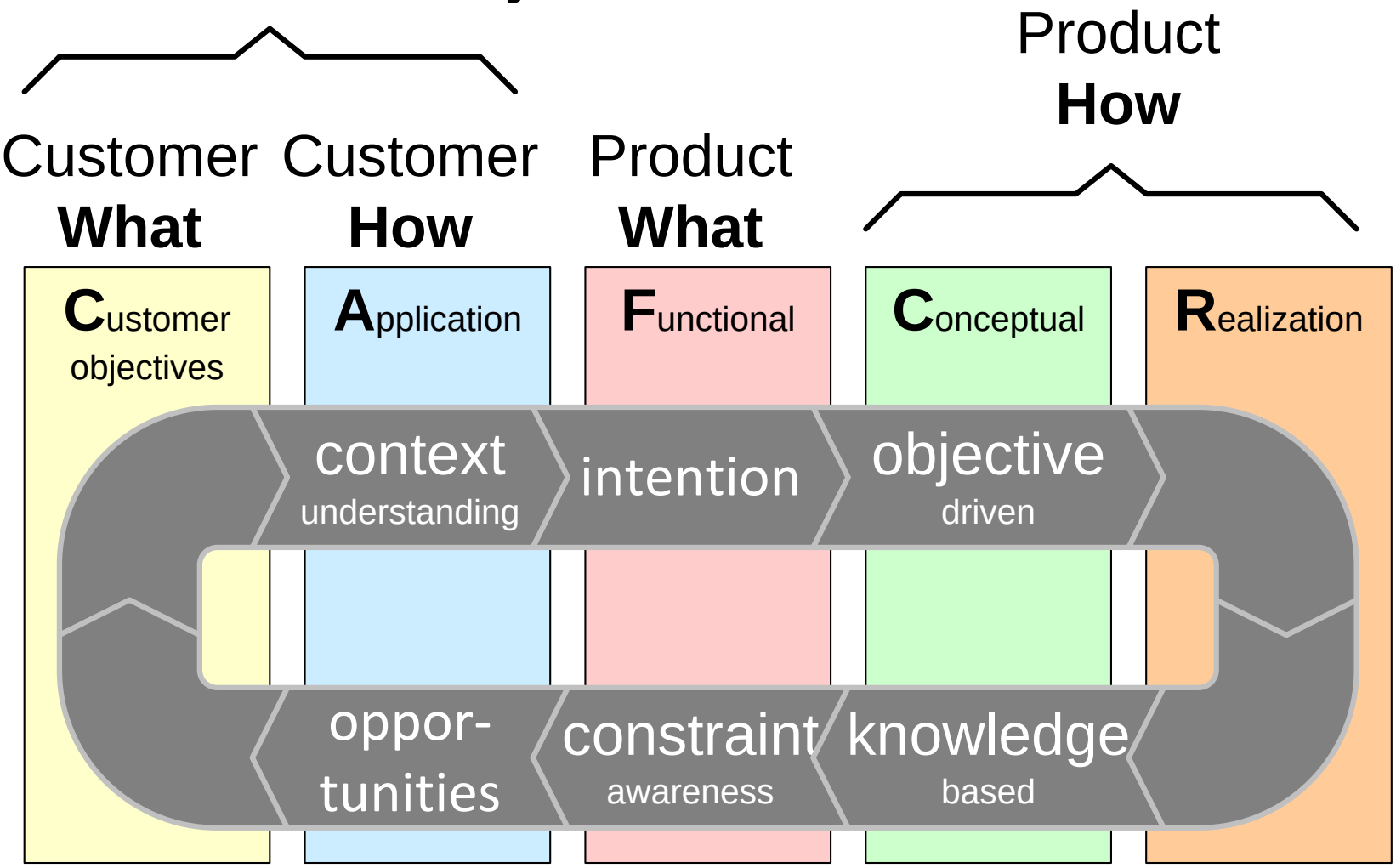


The “CAFCR” model

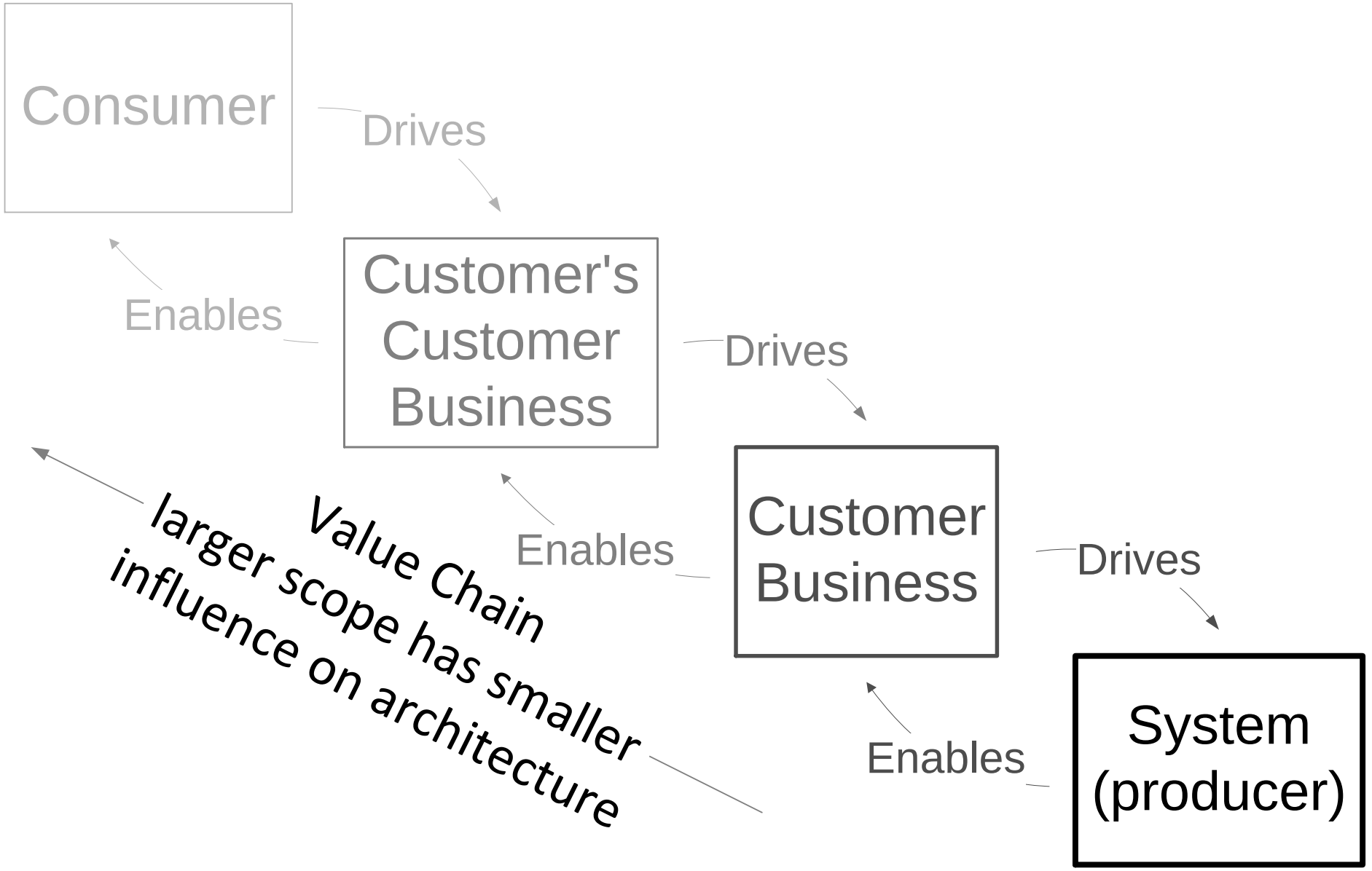


Integrating CAFCR

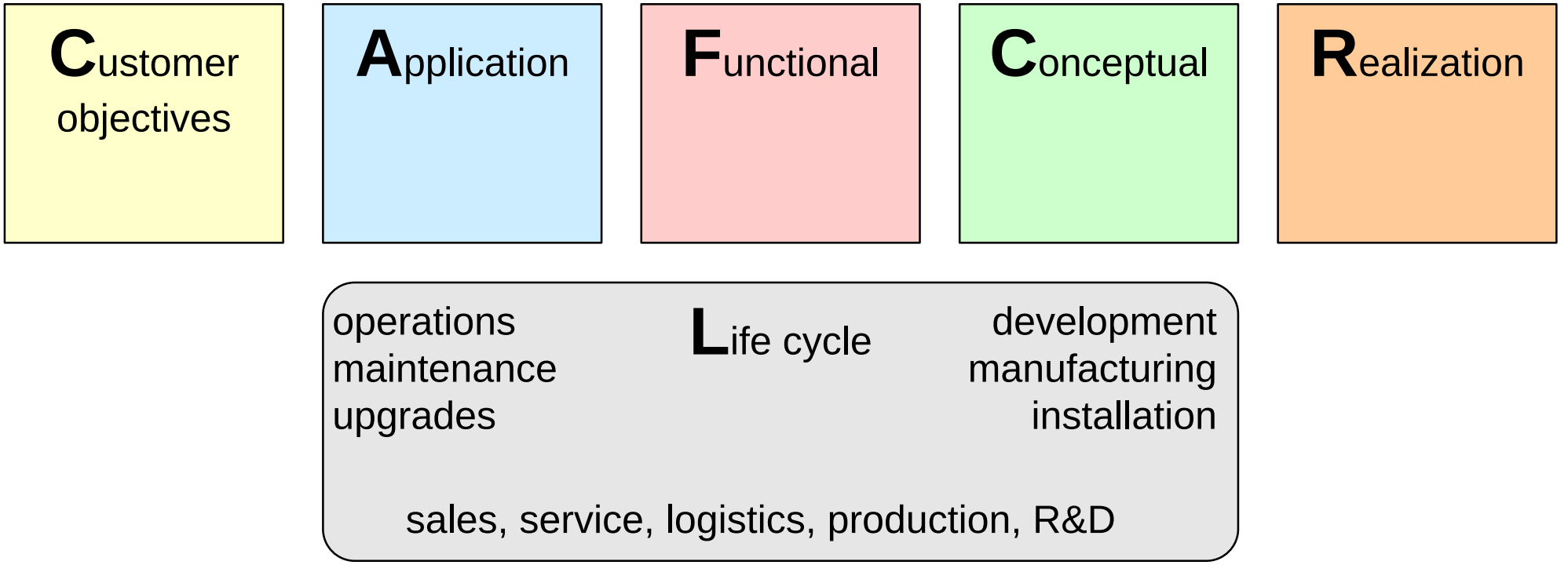
What does Customer need in Product and **Why**?



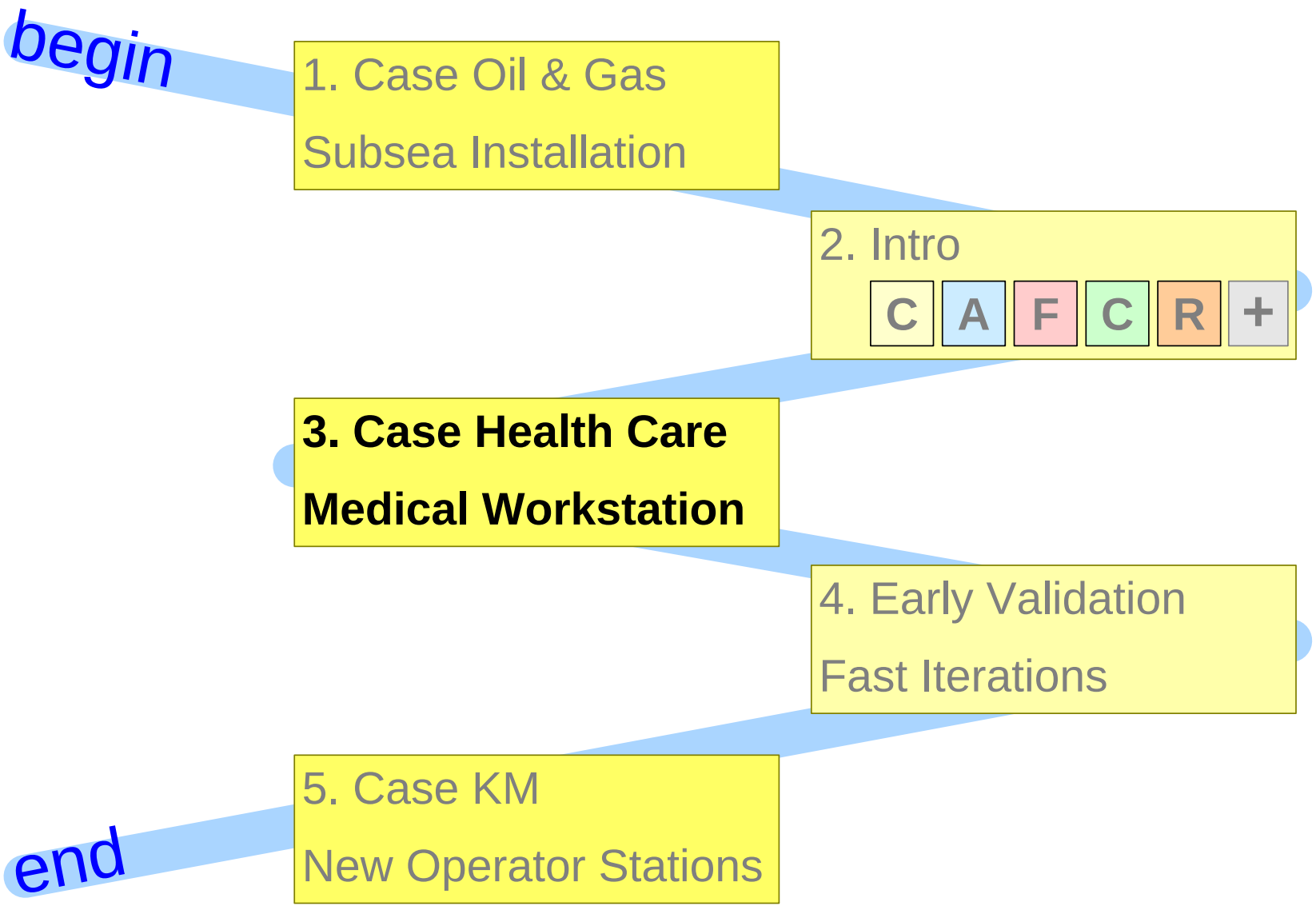
CAFCR can be applied recursively



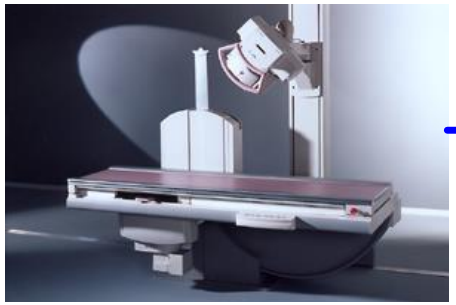
CAFCR+ model; Life Cycle View

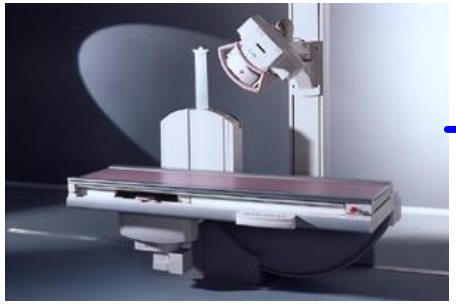


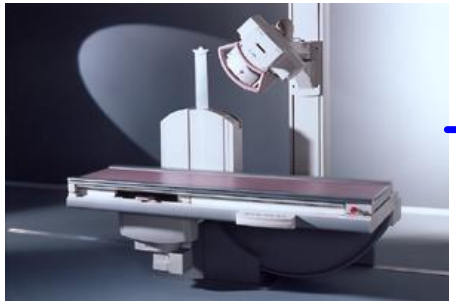
Health Care Case



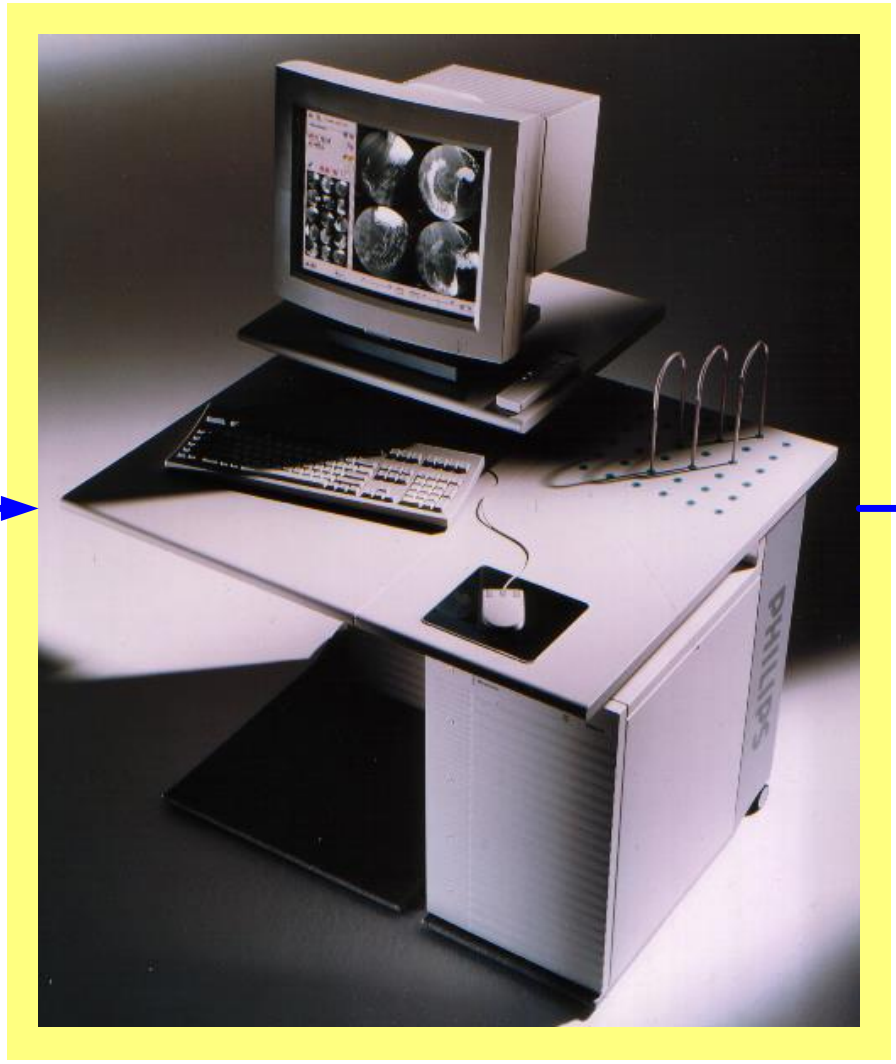
Easyvision serving three URF examination rooms







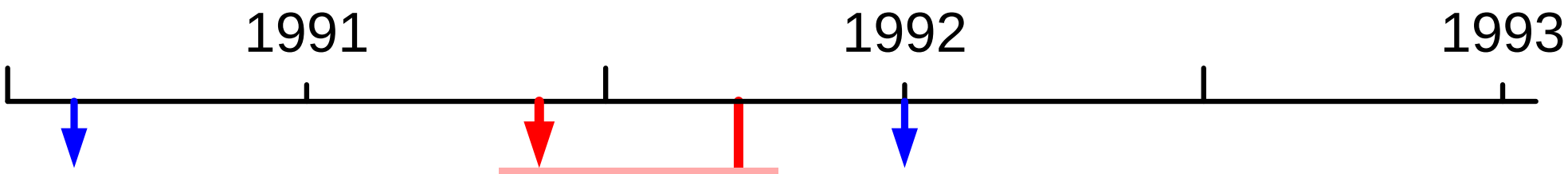
URF-systems



EasyVision: Medical Imaging Workstation

typical clinical image (intestines)

Chronology of Easyvision RF R1 development



basic application
toolboxes
100 kloc

interactive viewing

performance
problems

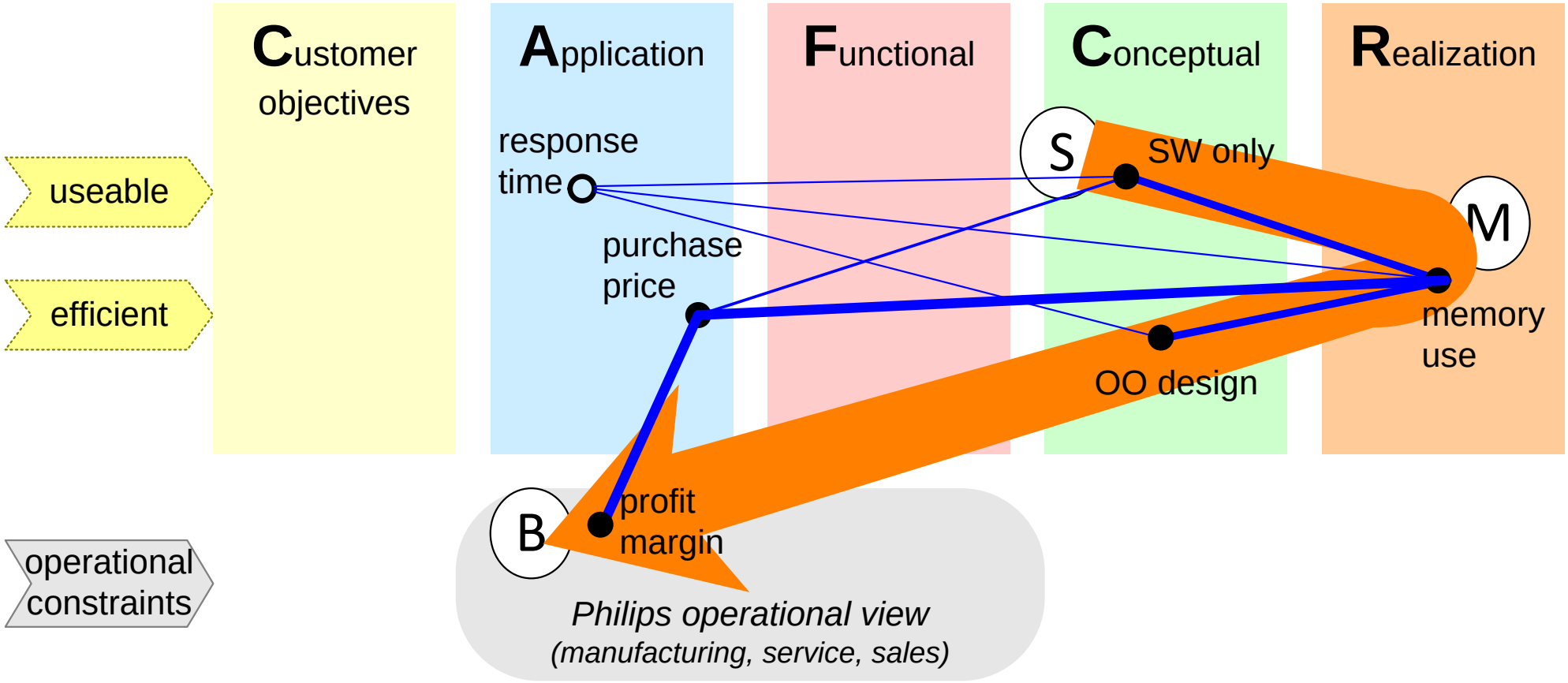
IQ
problems

Easyvision RF
integrated product
360 kloc

print server +
communication +
interactive viewing

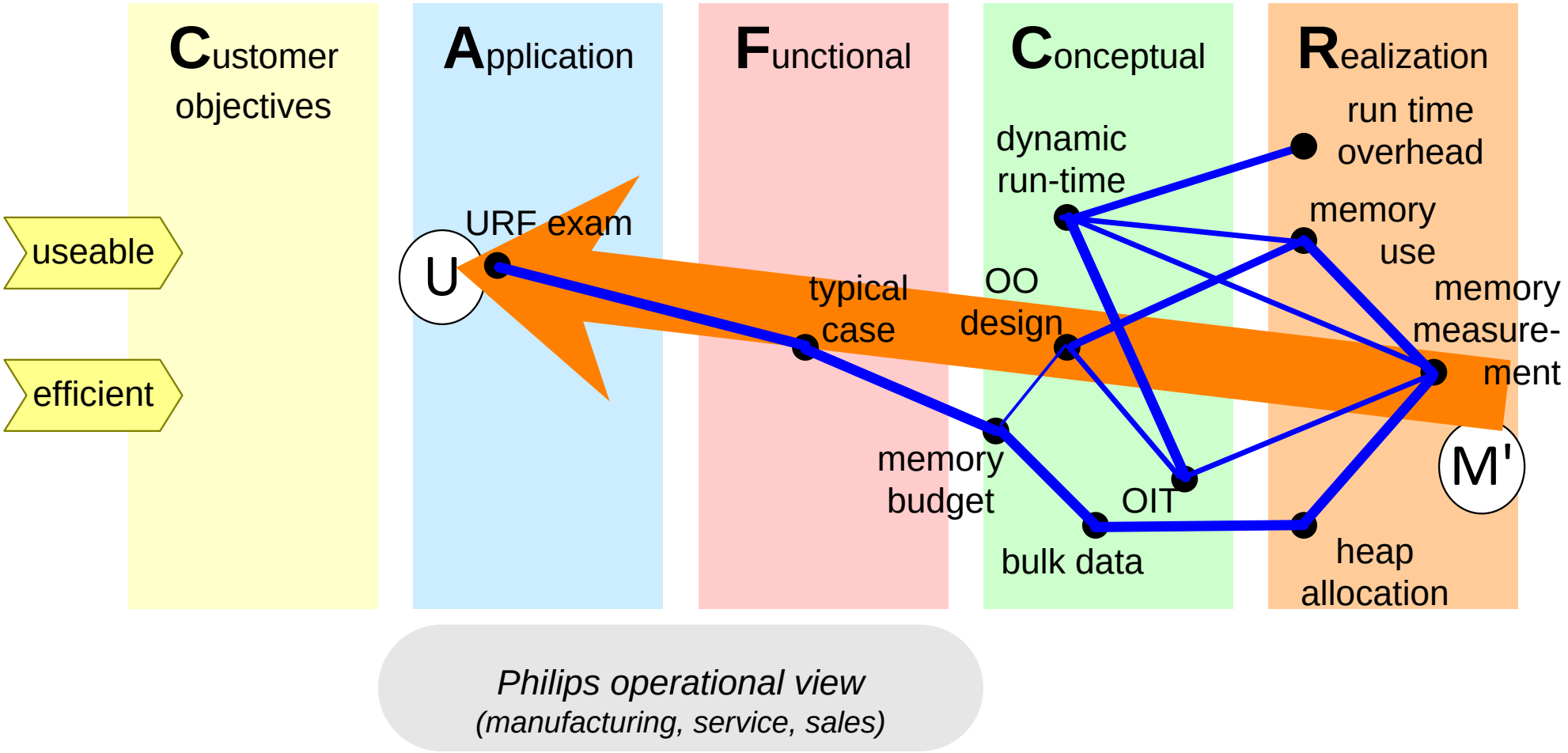
marketing opinion:
"All the functionality is available,
we only have to provide a clinical UI"

Thread of reasoning; introvert phase



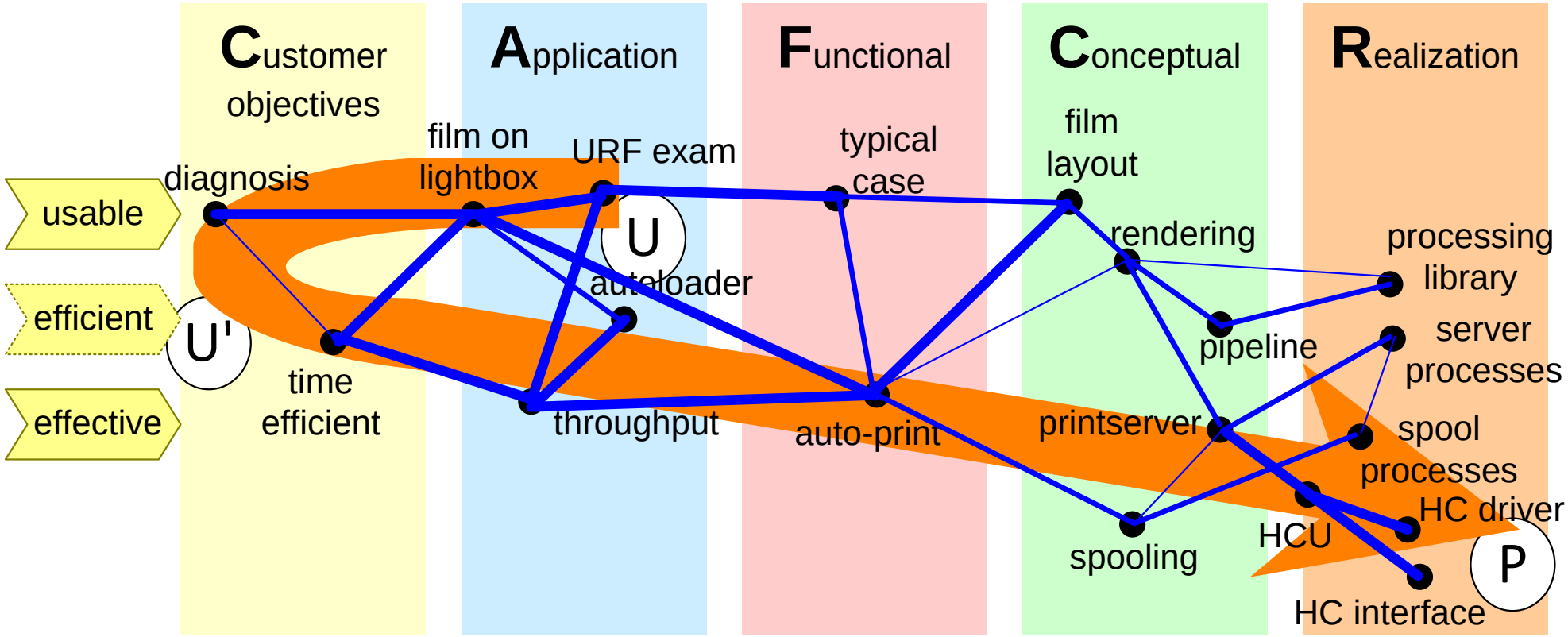
Introvert view: cost and impact of new technologies

Thread of reasoning; phase 2



How to measure memory, how much is needed?
from introvert to extrovert

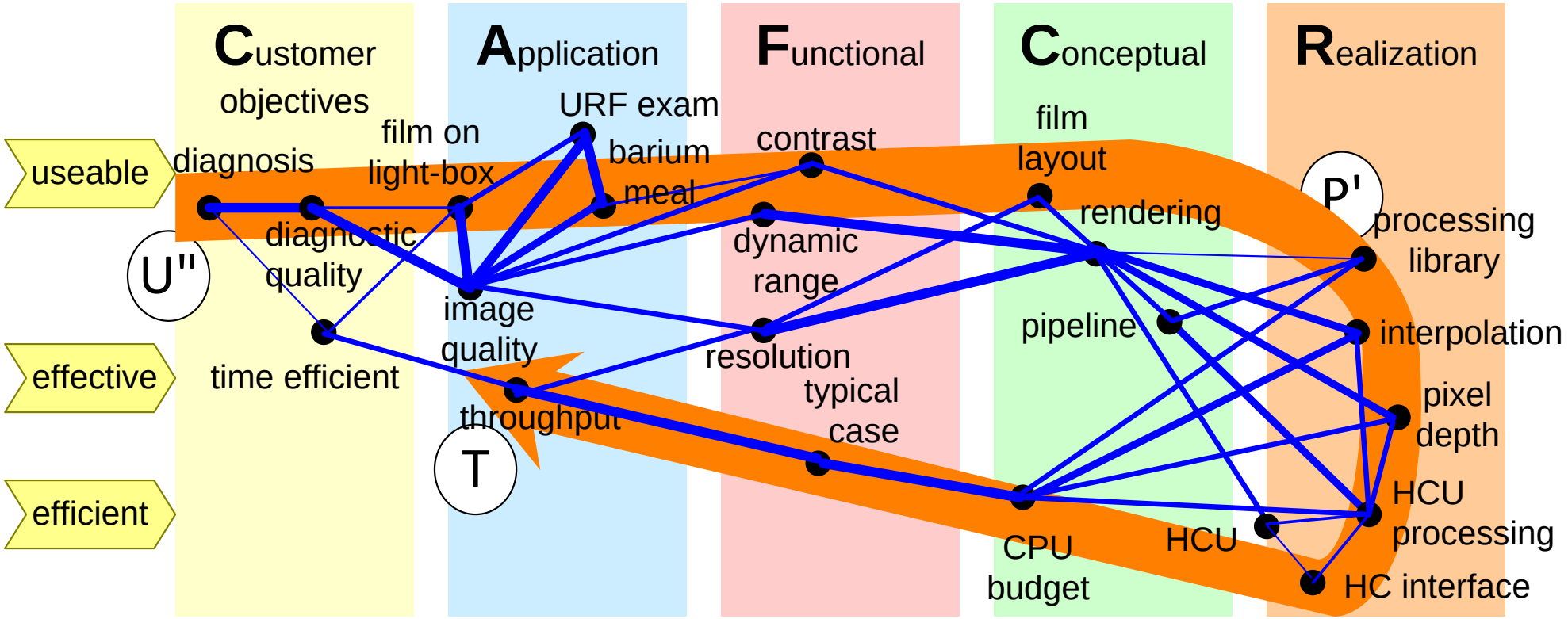
Thread of reasoning; phase 3



Philips operational view
(manufacturing, service, sales)

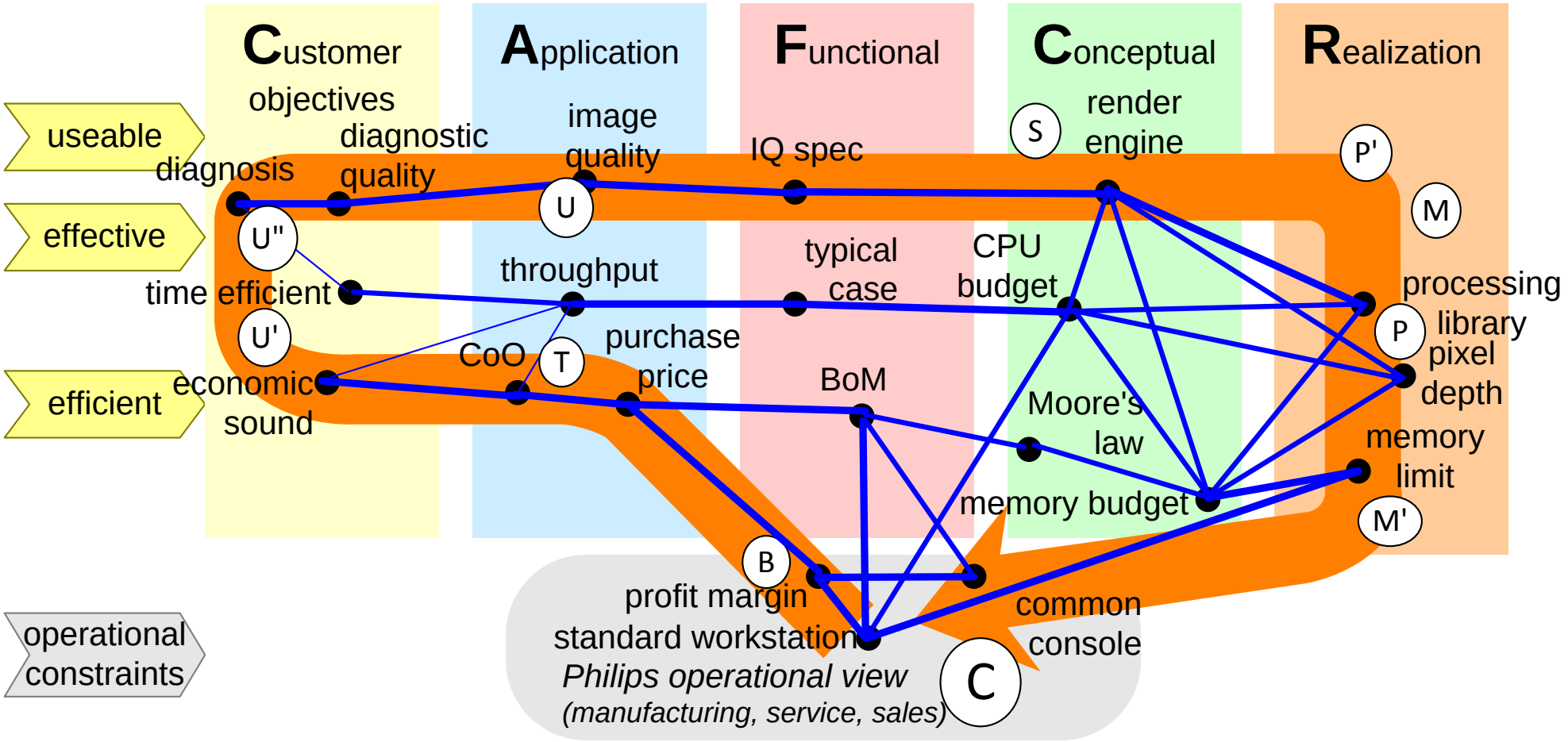
Radiologists diagnose from film, throughput is important
Extrovert view shows conceptual and realization gaps!

Thread of reasoning; phase 4



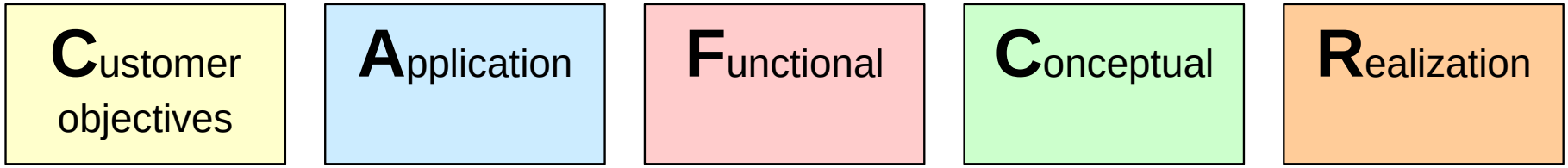
from extrovert diagnostic quality, via image quality, algorithms and load, to extrovert throughput

Thread of reasoning; phase 5



cost revisited in context of clinical needs and realization constraints; note: original threads are significantly simplified

Reflecting on the Health Care Case



Many customers[1] are conservative for valid reasons:

"Do not disturb our volume production"

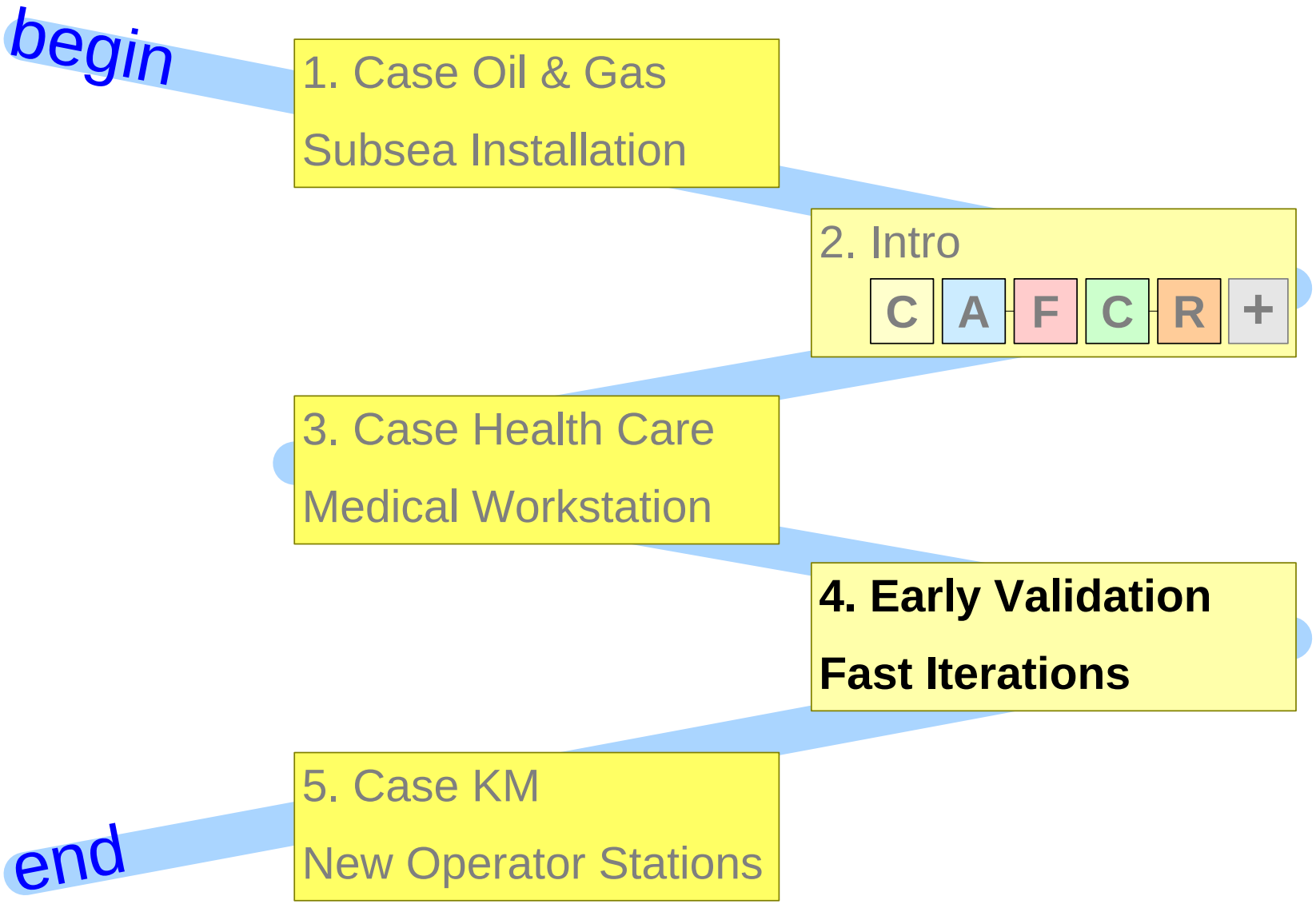
Every delivery means change, change means risk of disturbance

application models and prototypes are *proxies* for deliveries

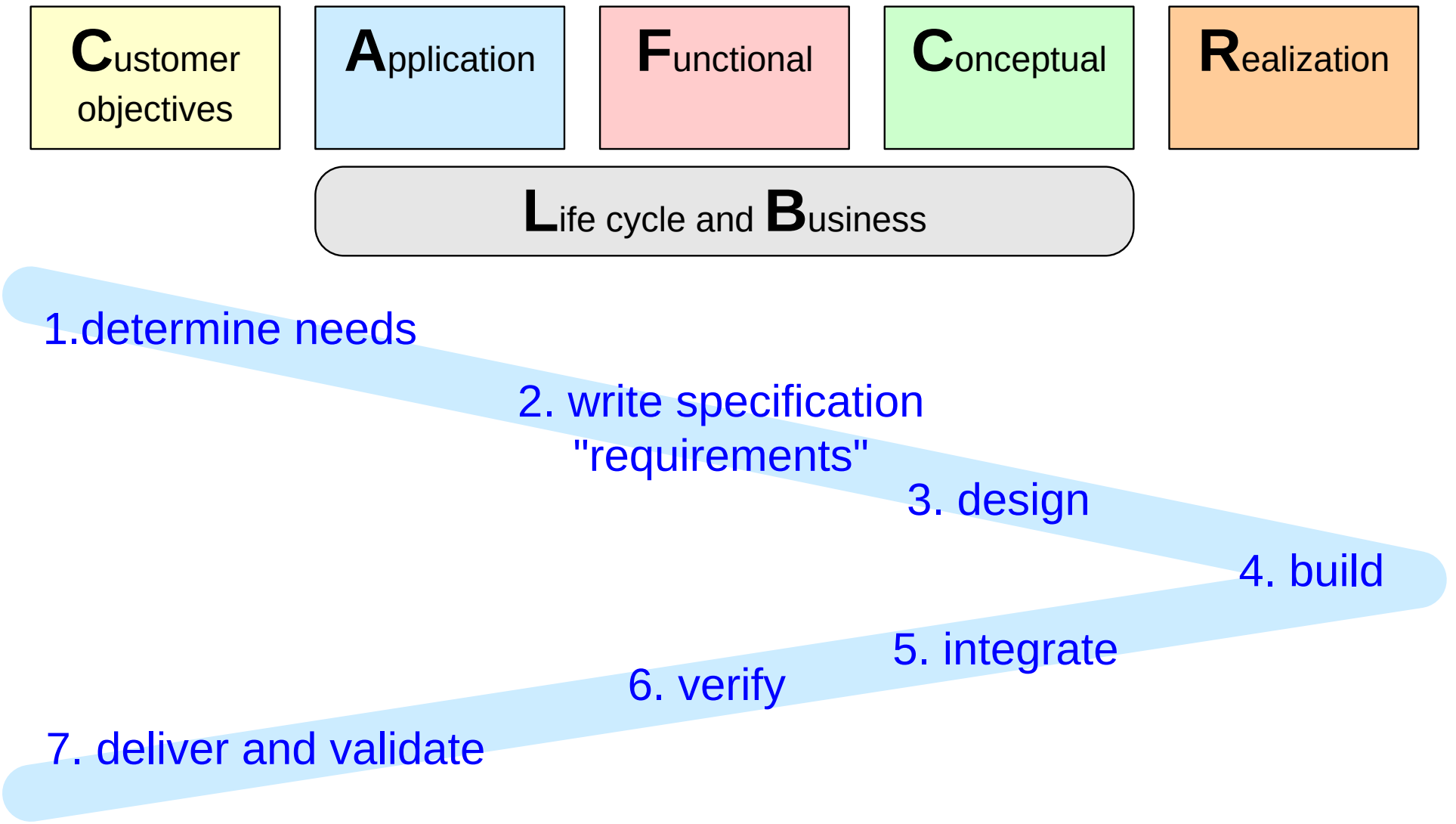
An active and close relation with demanding customers is required to obtain timely feedback

[1]Not only in health care, but also in manufacturing, defense, oil and gas, ...

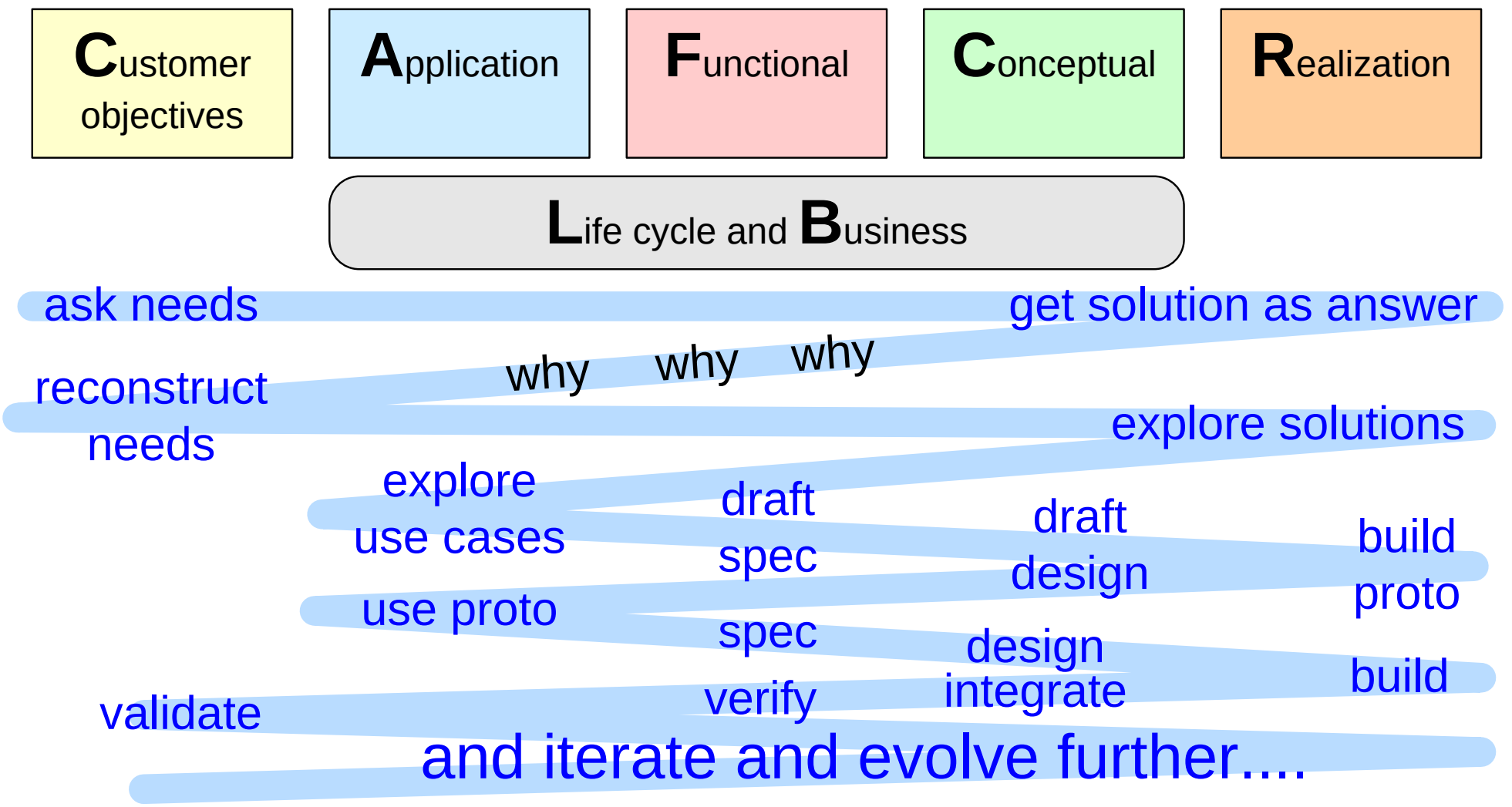
Early Validation: Fast Iterations



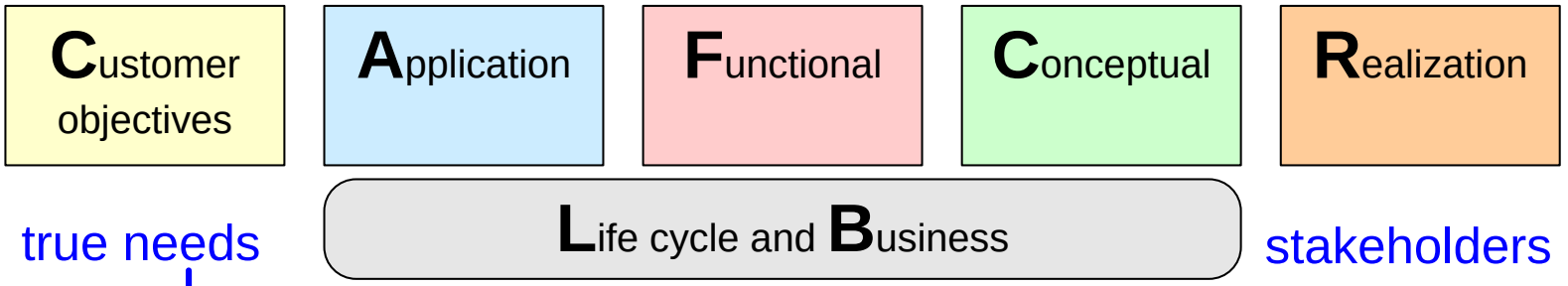
The Conventional Waterfall Approach



Iterative Approach Using CAFCR



Reflection on CAFCR and Iteration



true needs

↓

true value

stakeholders tend to pose solutions

← we have to reconstruct the needs

multiple solutions satisfy the needs

unforeseen shortcomings degrade value

← unforeseen opportunities increase value

constraints

opportunities

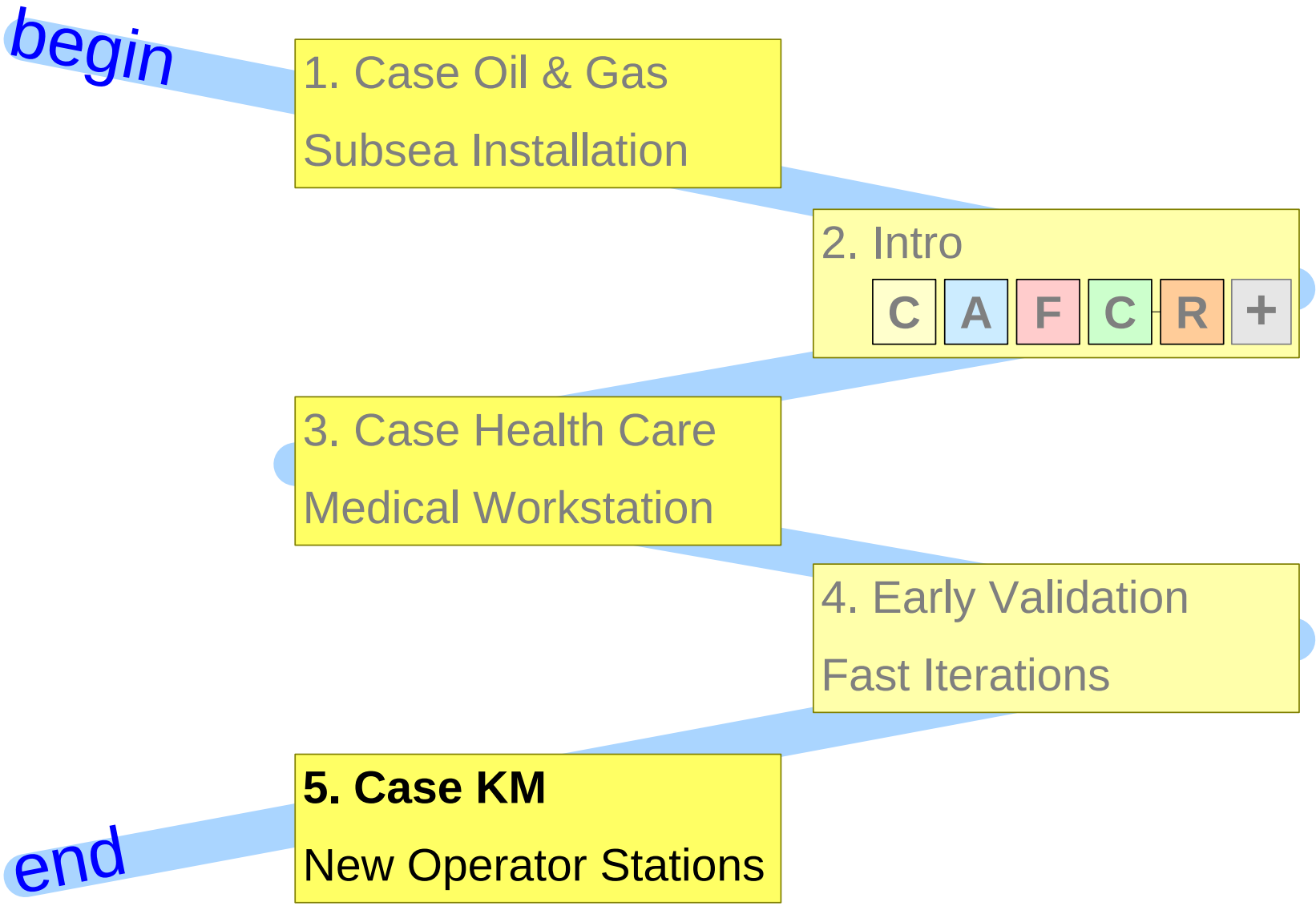
the devil is in the detail

We learn faster when we iterate faster,

but learning requires critical evaluation and reflection

Stakeholders tend to respond on actual deliverables.
Prototypes are useful, but we have to switch to delivery in time to get feedback

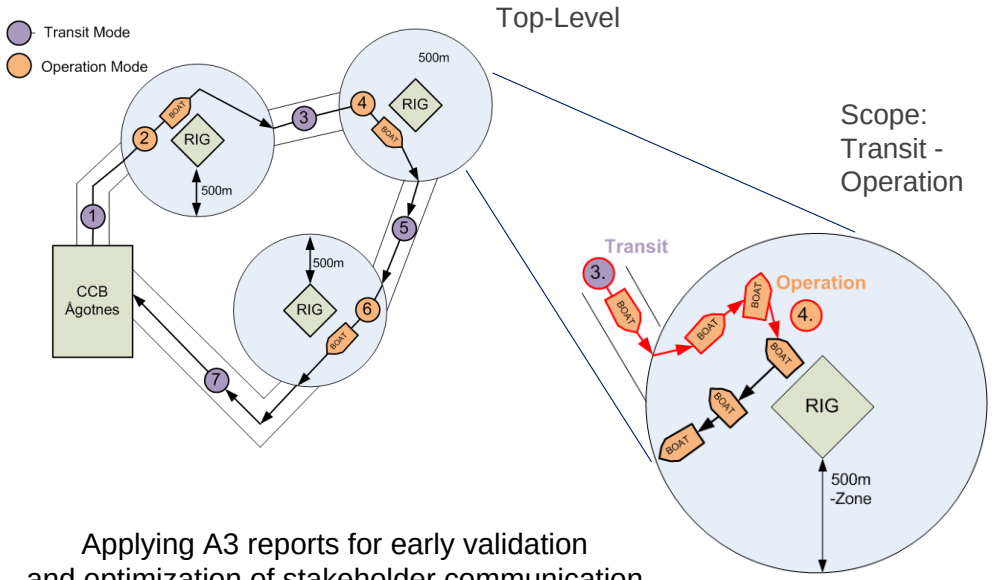
A KM case: new Operator Stations



Master Project Kristian Frøvold

Applying A3 reports for early validation and optimization of stakeholder communication in development projects

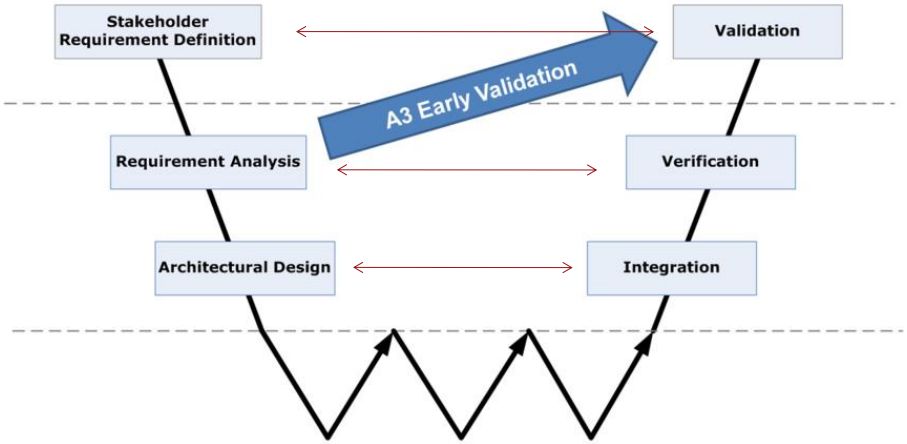
by Kristian Frøvold



Applying A3 reports for early validation
and optimization of stakeholder communication
in development projects
Kristian Frøvold, Gerrit Muller, and Michael Pennotti
INCOSE 2017 in Adelaide, Australia
https://gaudisite.nl/INCOSE2017_Frovold_A3.pdf

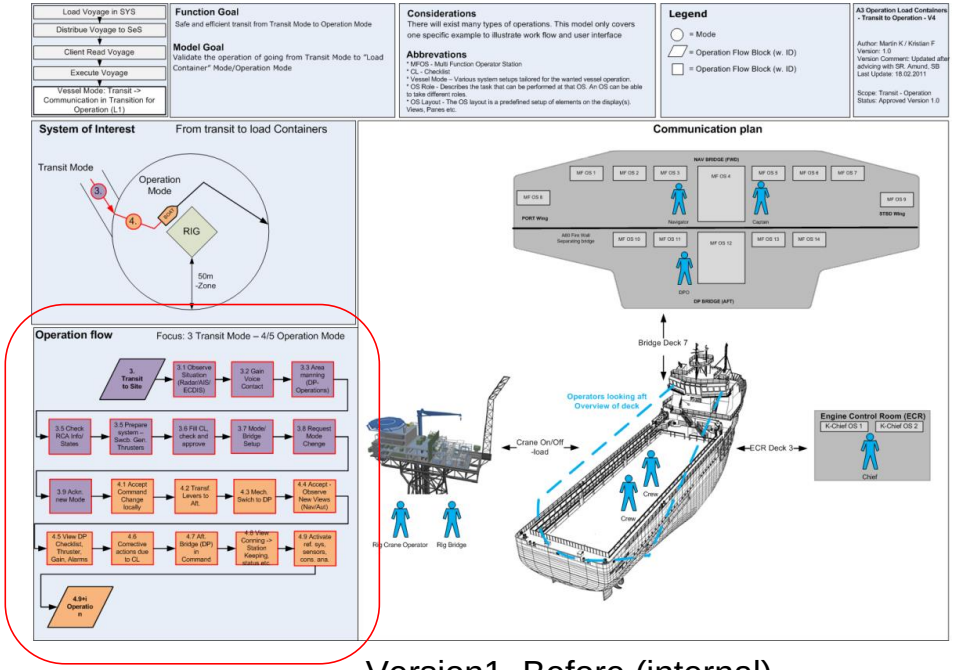
A3s for Early Validation

- We depicted a **proposed solution** for the system function at an **early** stage
- The **Vessel Mode functions** goal is to increase safety and efficiency on voyages/ operations
- In this case we collected information from and created the **A3** reports with **stakeholders** mentioned earlier
- "**To collect real information you have to go there**"



Viking Energy – Deepsea Atlantic
6 m (9 m) waves - ±40 knots (20 m/s wind)

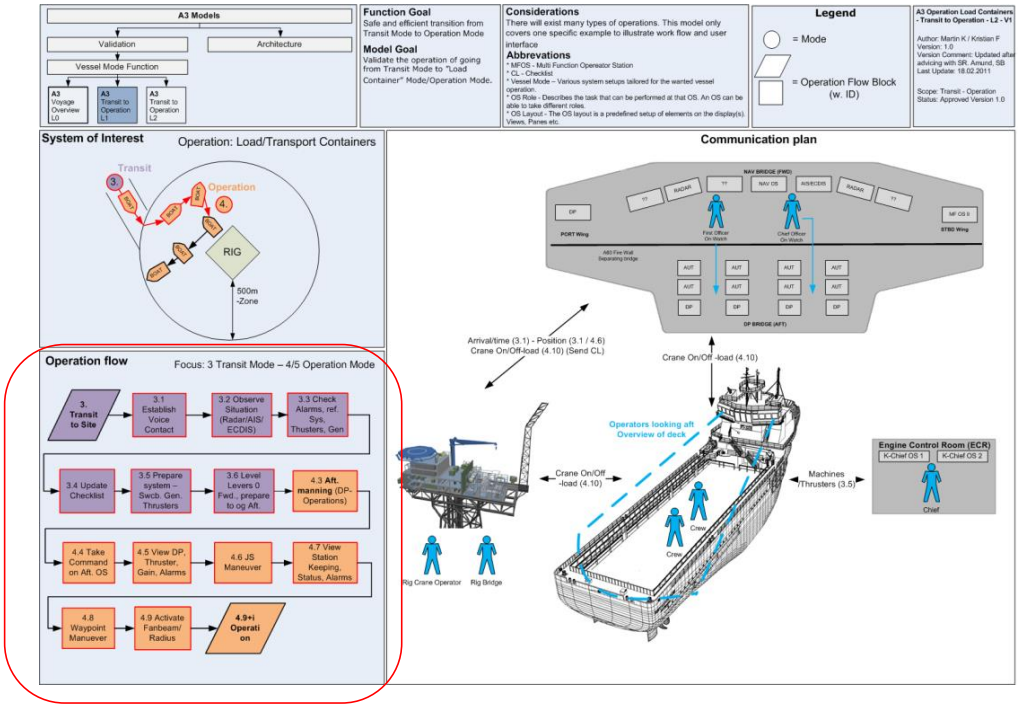
Early Validation Results



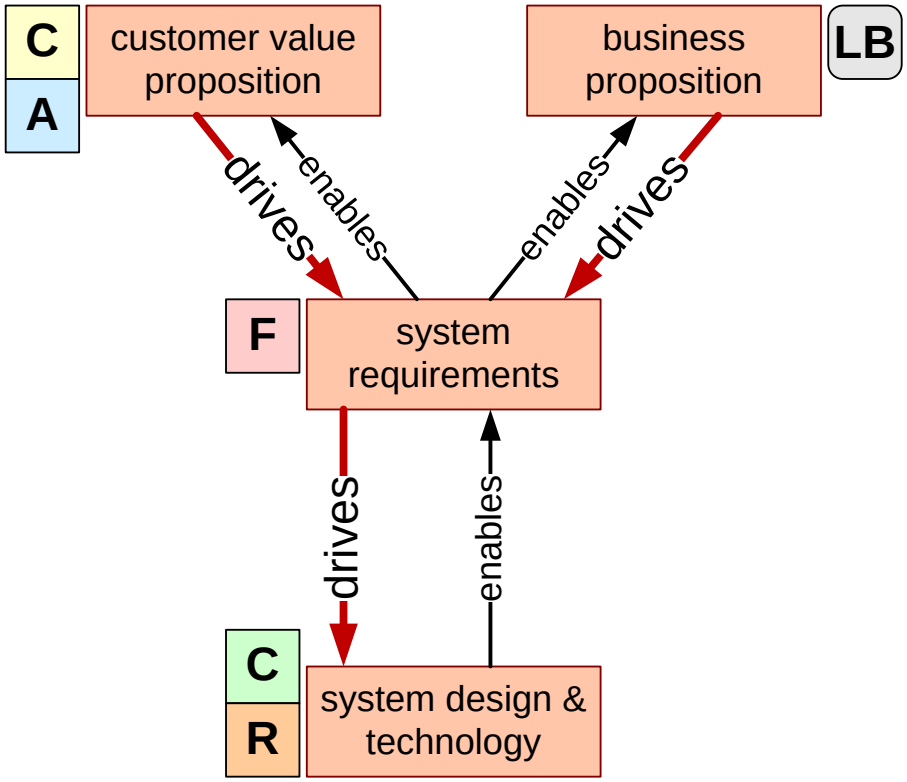
Version1, Before (internal)

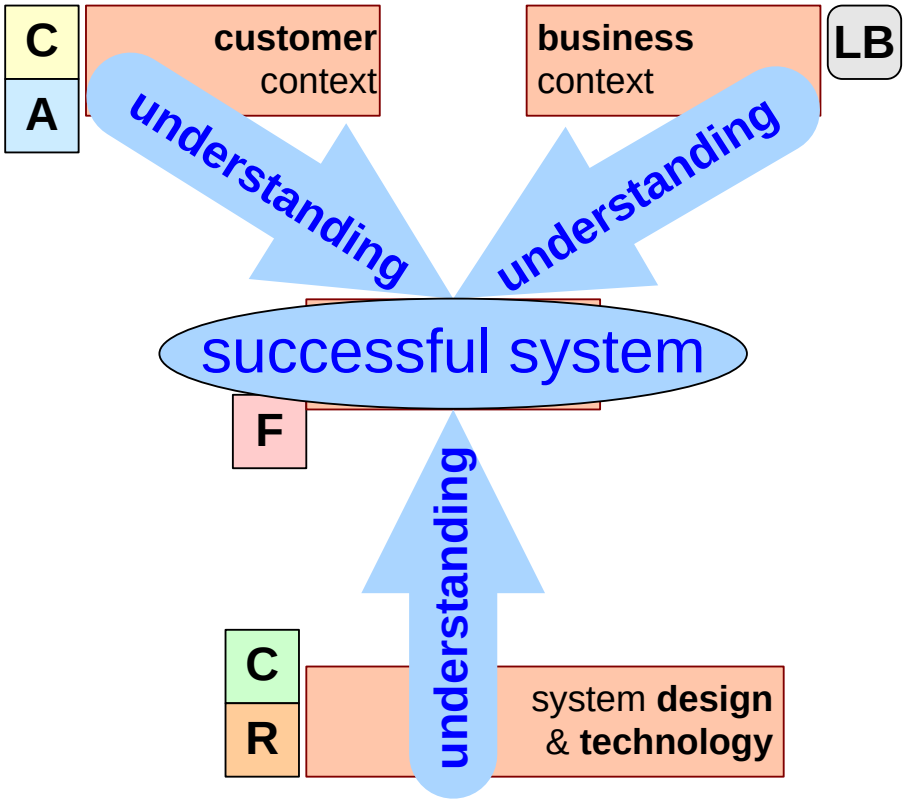
Real/V2 has fewer operations steps

Version 2, After (external)



Summary





Chicken and Egg: Understanding is created by Successful Deliveries