

What roles of politicians, managers, and systems engineering will be effective in sociotechnical systems?

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Abstract

The functionality that we use as organizations and citizens increasingly arises from a complex interplay of man-built systems, individuals and organizations, and the environment. It is a challenge to get the desired functionality and features consistently, reliably and affordably, without unwanted side effects. This is exactly the role that systems engineers have for classical systems. Who takes on this role for complex dynamic supersystems of people, environment and man-built systems?

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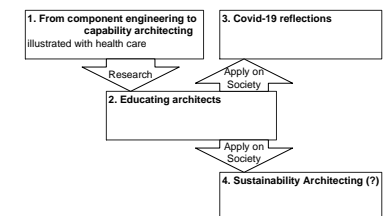
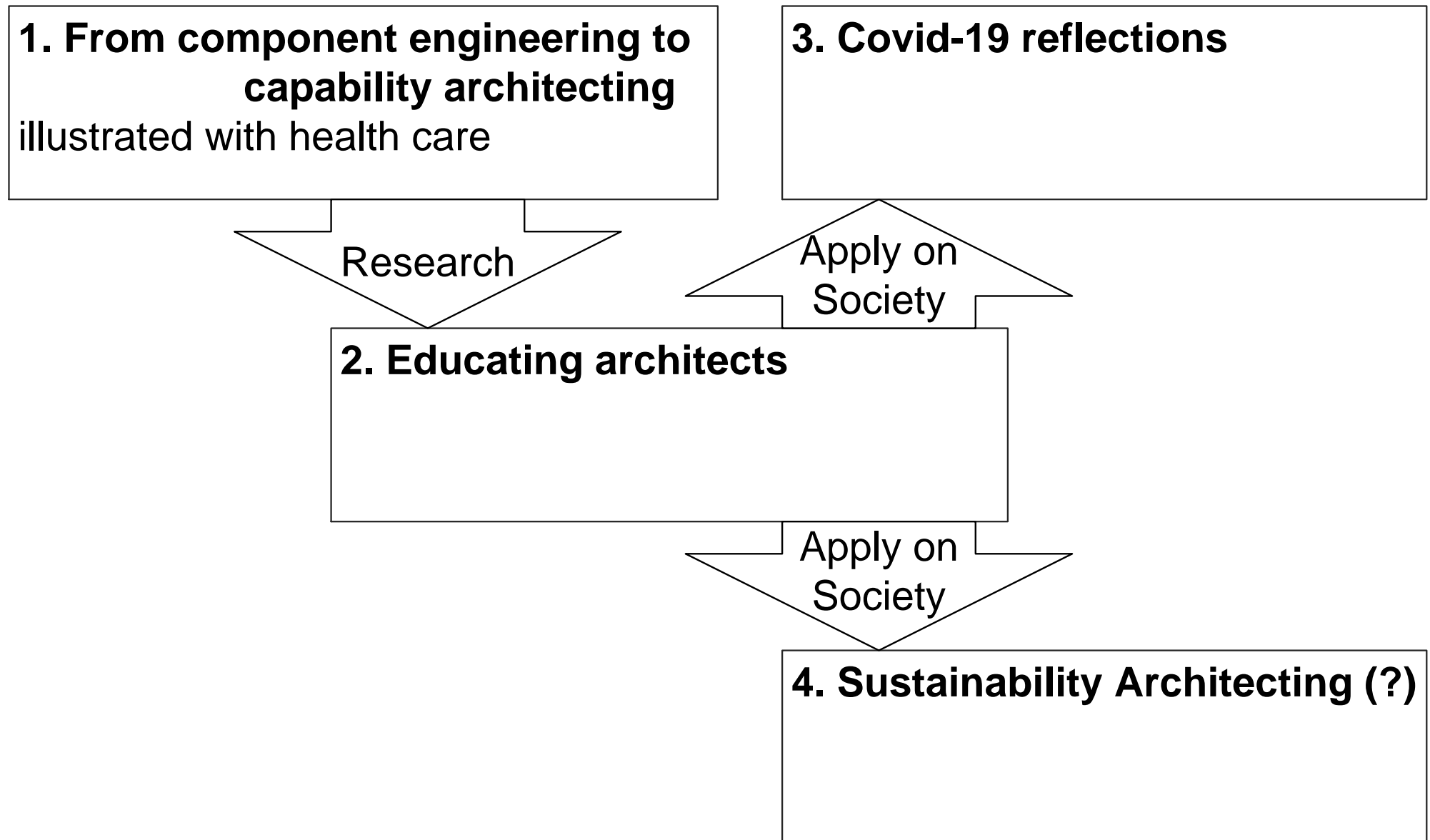
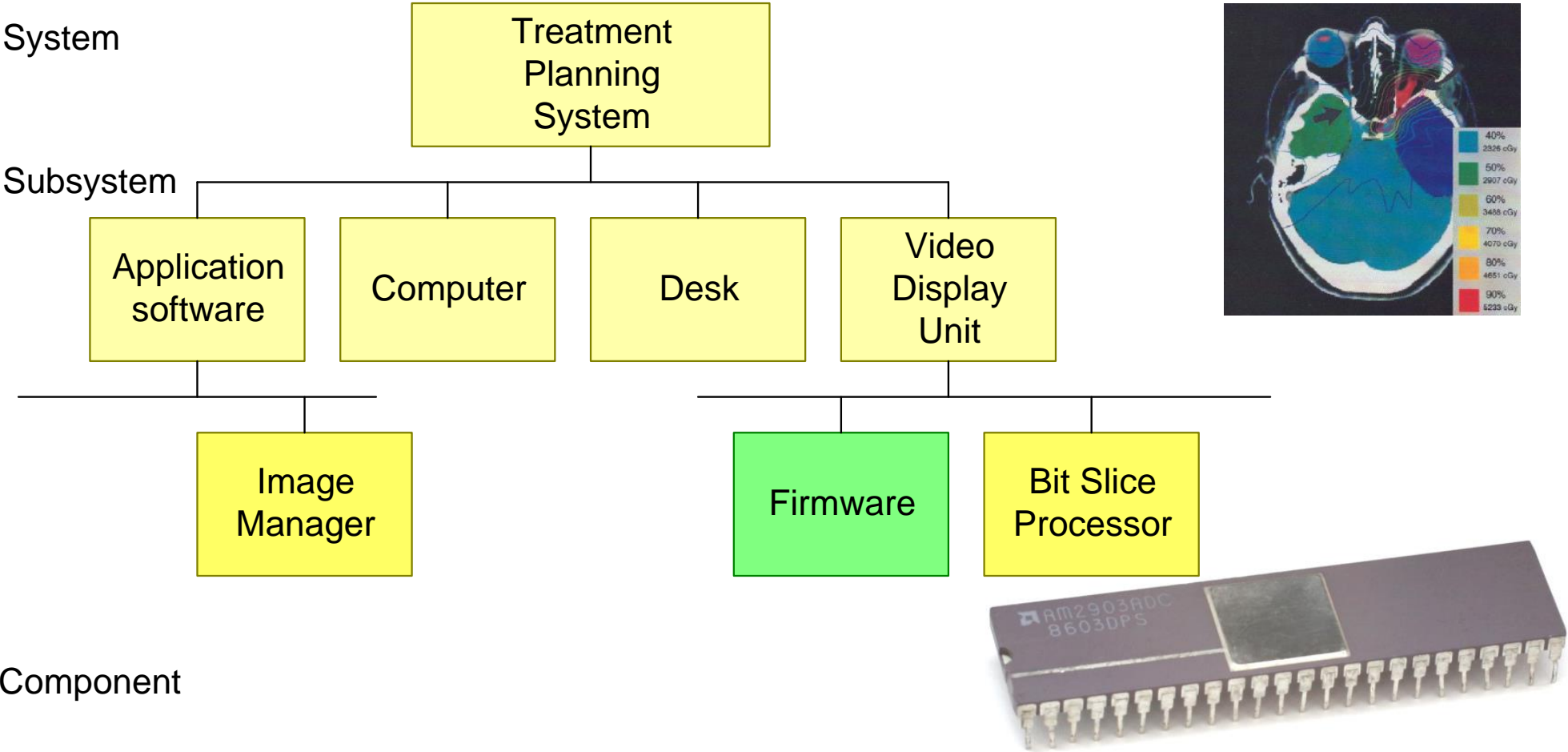


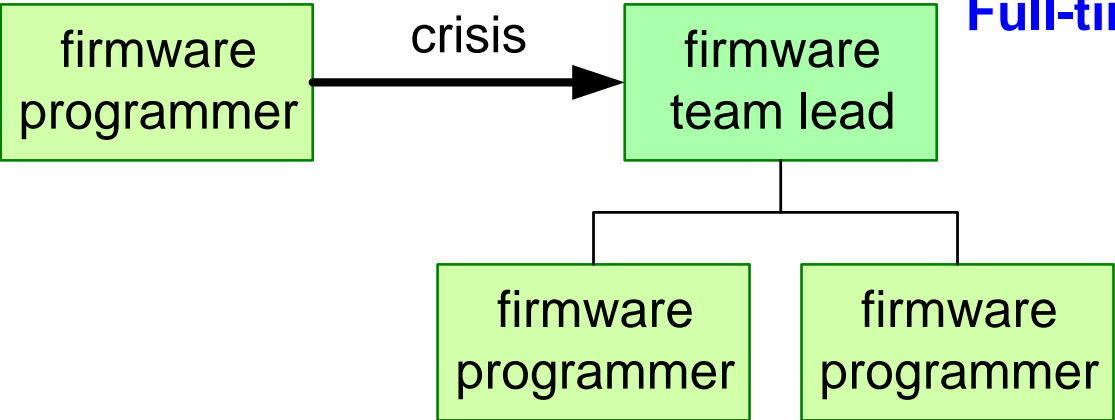
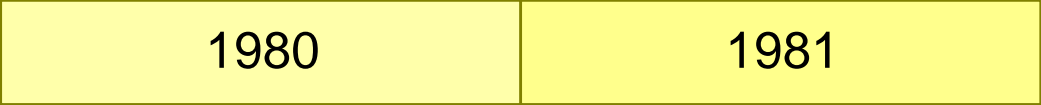
Figure of Content



Firmware for Treatment Planning



From programmer to Team Leader

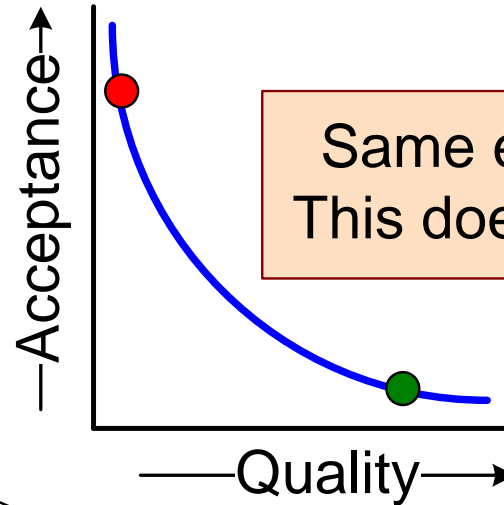
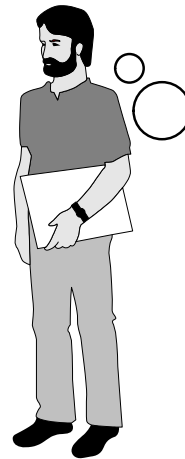


Full-time meeting circus!



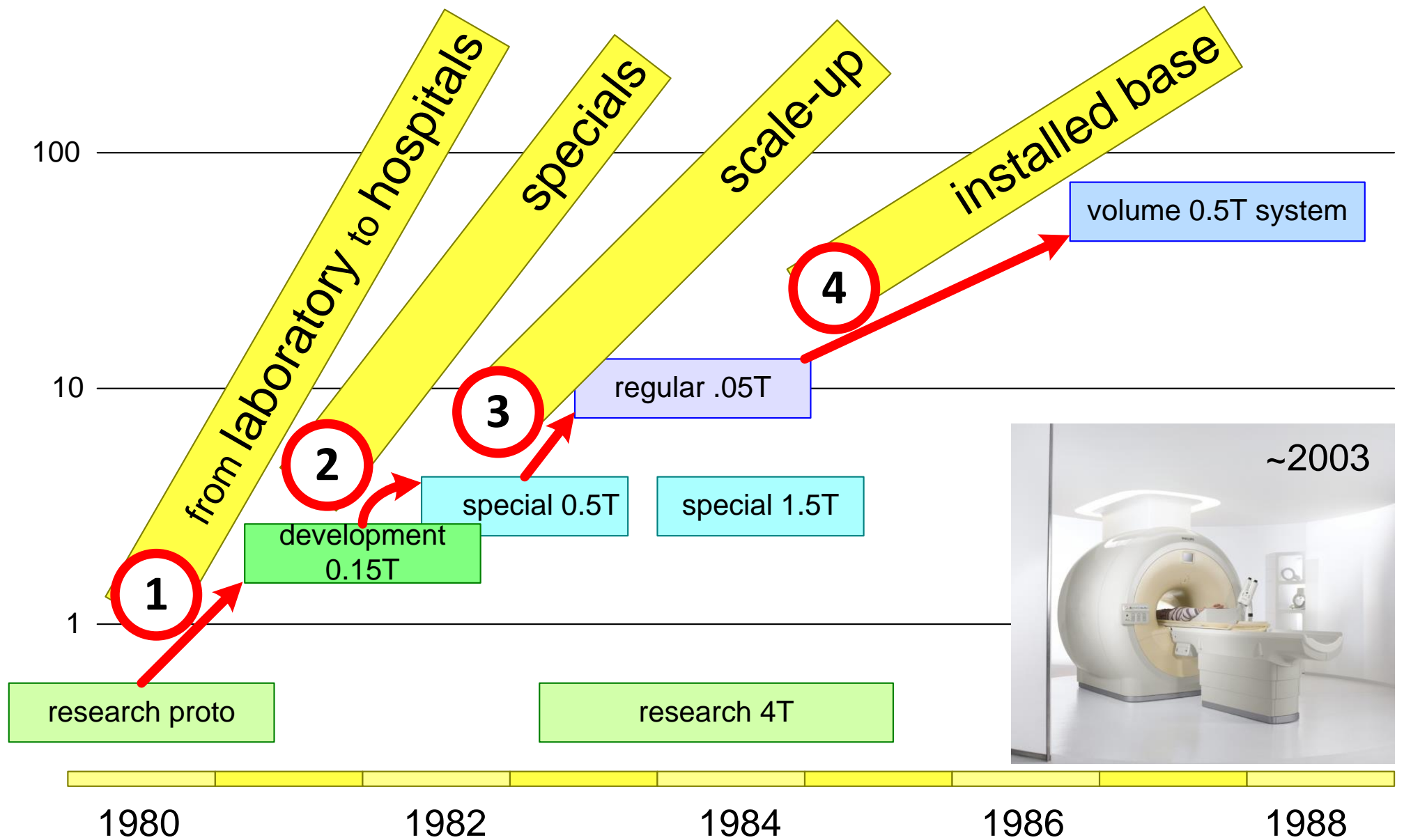
The Organization and Efficiency Expert

$$\text{Effectiveness} = \text{Quality} * \text{Acceptance}$$

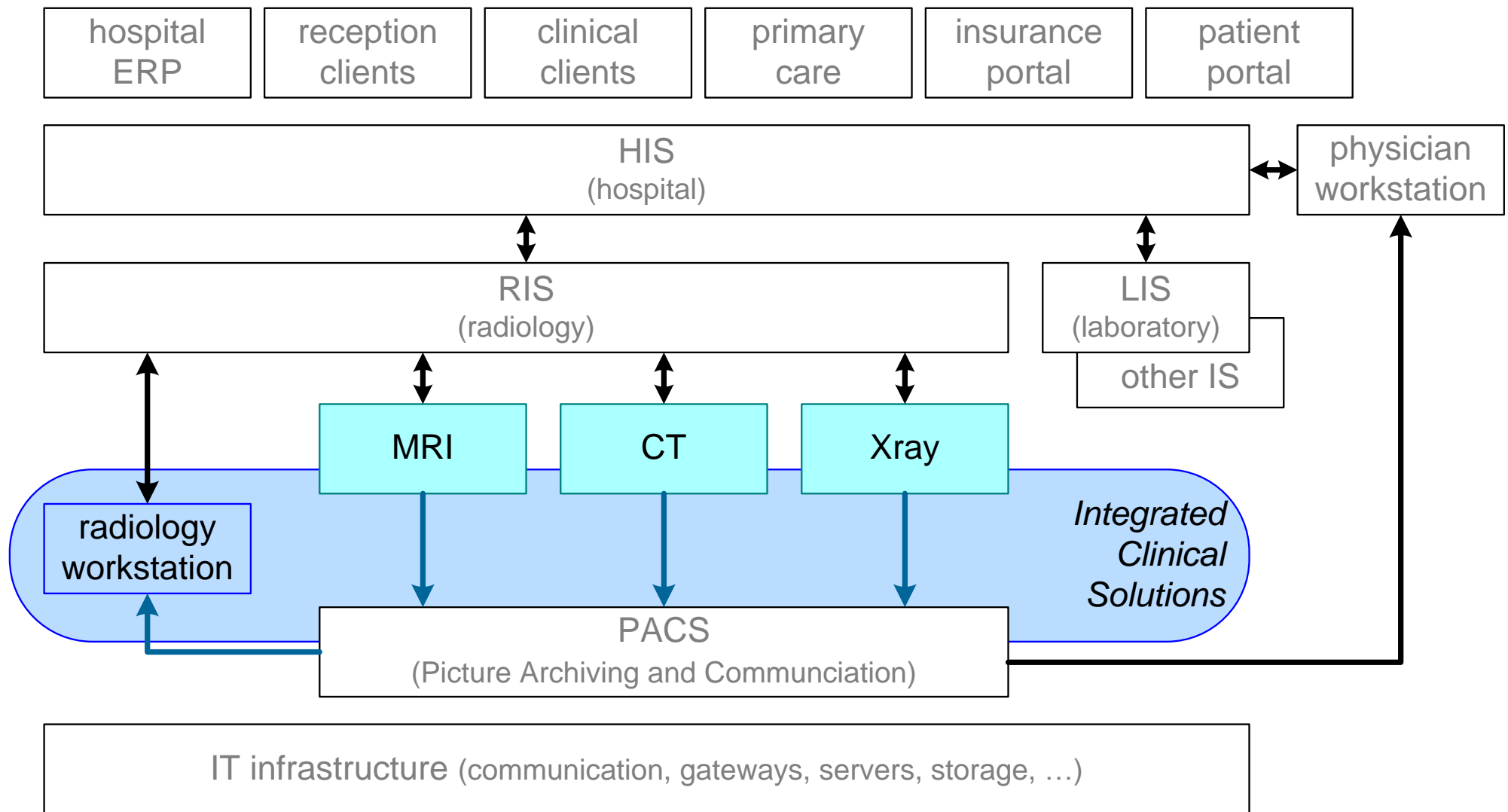


Same effectiveness???
This doesn't make sense!

Architect Scope: The System, Its Application and Life Cycle



Toward Systems of Systems



From: NK-ICT architectuur juryrapport, 2005, special mention:

- *Het verhaal geeft een goed leesbare en toegankelijke beschrijving van de context, de problematiek en de belanghebbenden in de zorgsector.*
- *Een uitzonderlijk groot IT probleemgebied met zijn complexe maatschappelijke en politieke context is teruggebracht tot een compact en begrijpelijk verhaal.*
- *Het doel van de architectuurbeschrijving wordt beschreven: “instrument om te komen tot afstemming met al die partijen”.*
- *De beslissingen en principes worden helder geformuleerd.*

followed by more critical comments

in memoriam of Jan Turk, one of the initiators of the NK-ICT

The Dutch Senate killed the Electronic Patient Record in March 2011

Summary of Architecting Practice

1. From component engineering to capability architecting

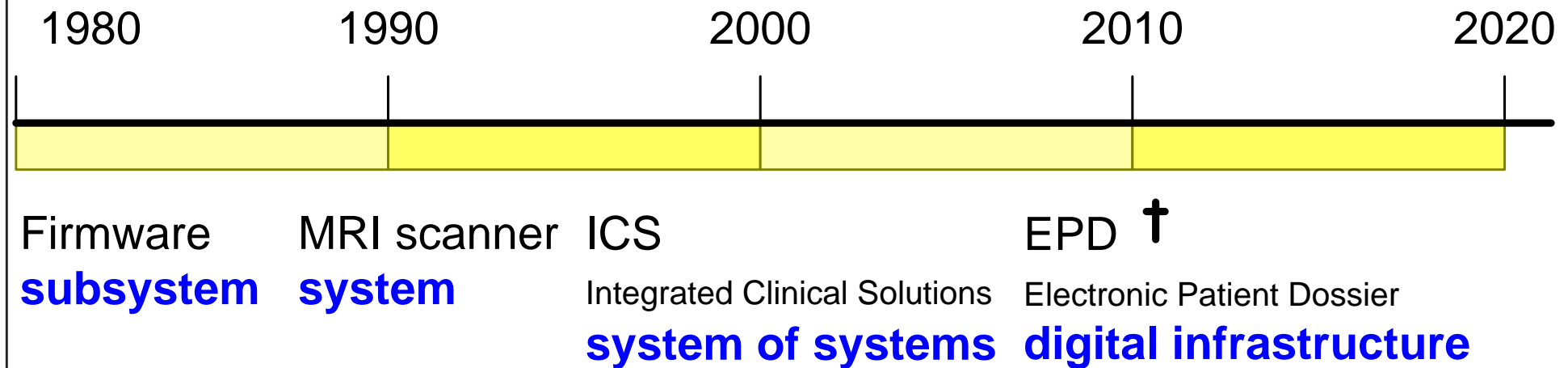


Figure of Content

1. From component engineering to capability architecting illustrated with health care

3. Covid-19 reflections

Research

Apply on Society

2. Educating architects

Apply on Society

4. Sustainability Architecting (?)

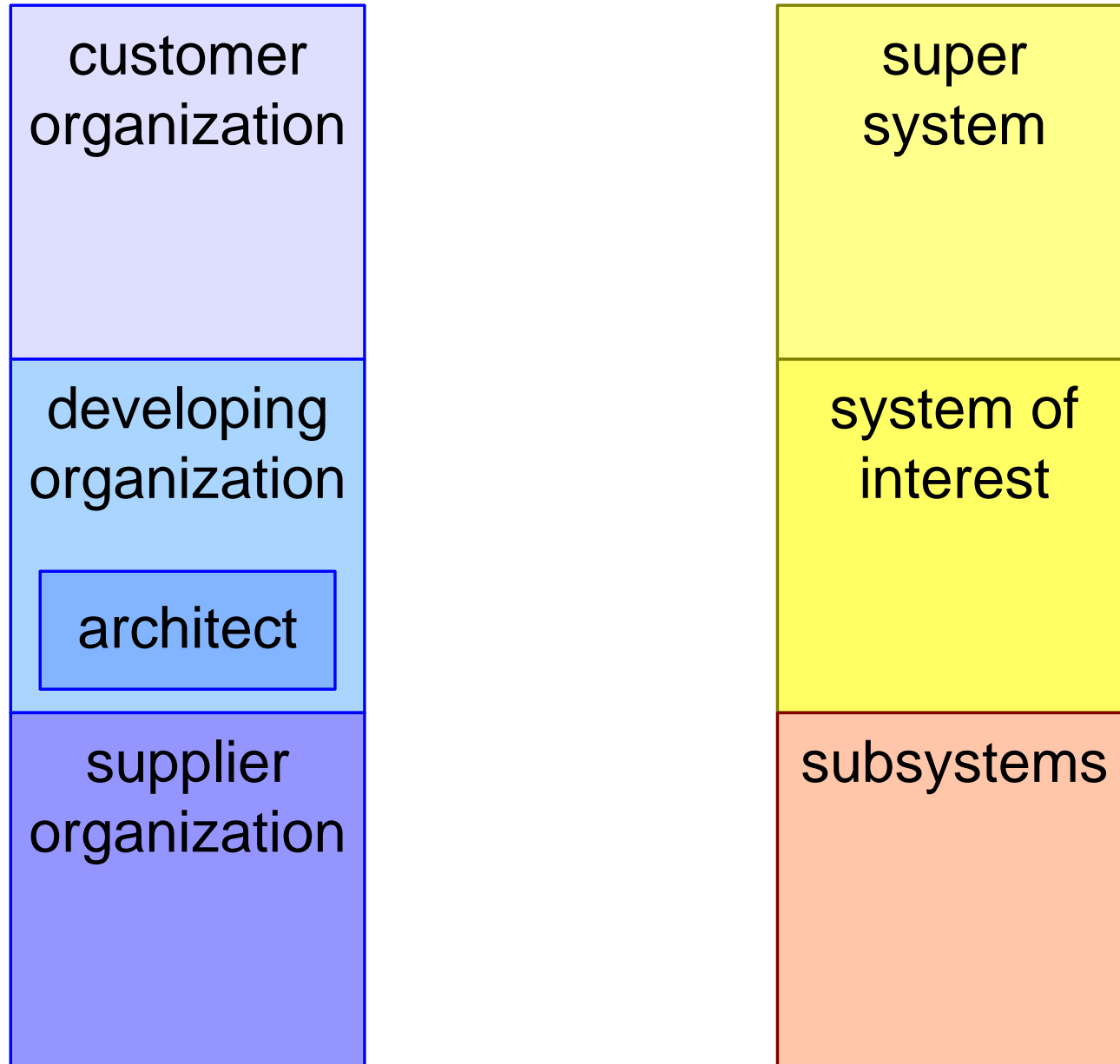
Our Primary Interest

developing
organization

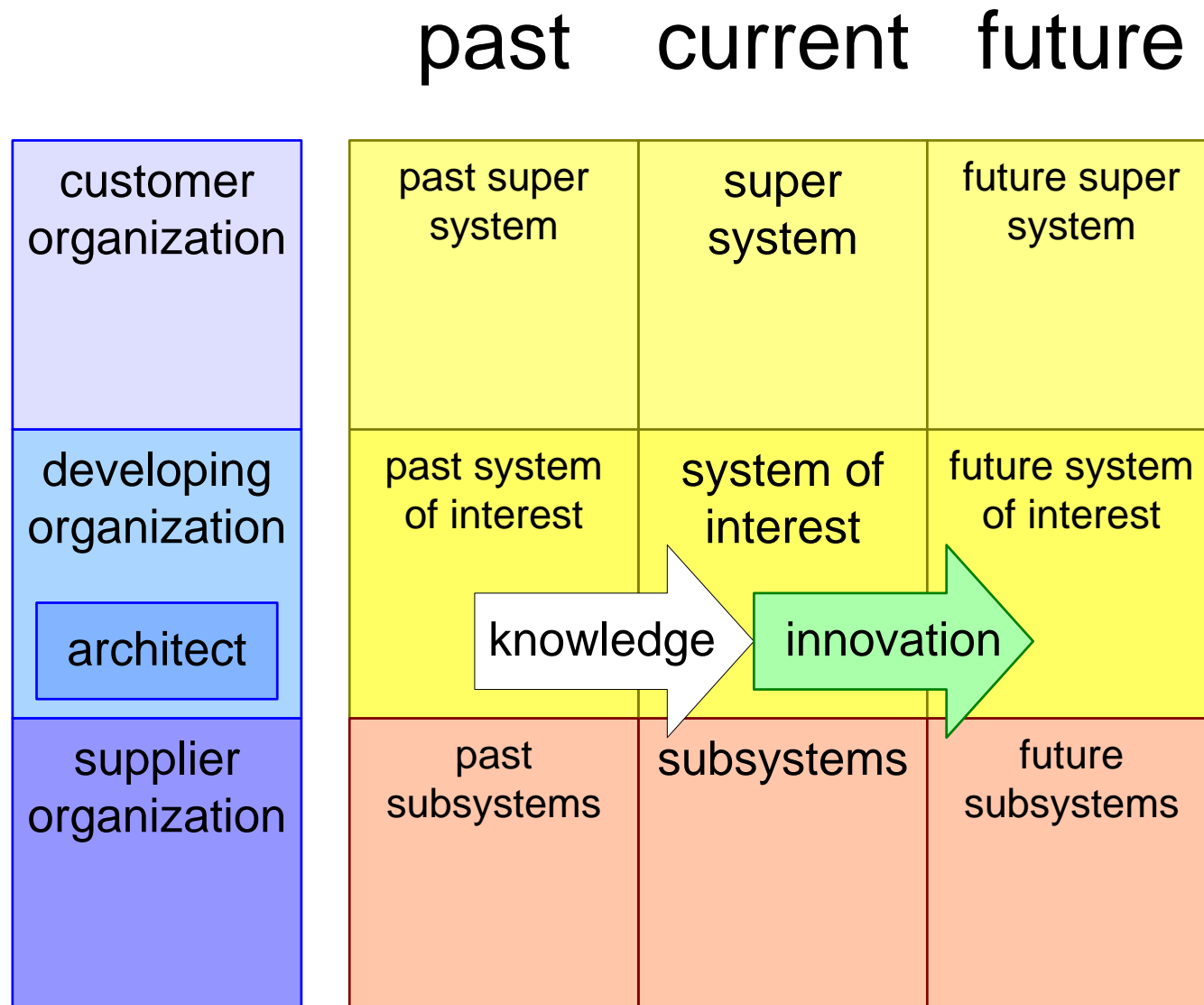
architect

system of
interest

Context, Zoom-out and Zoom-in

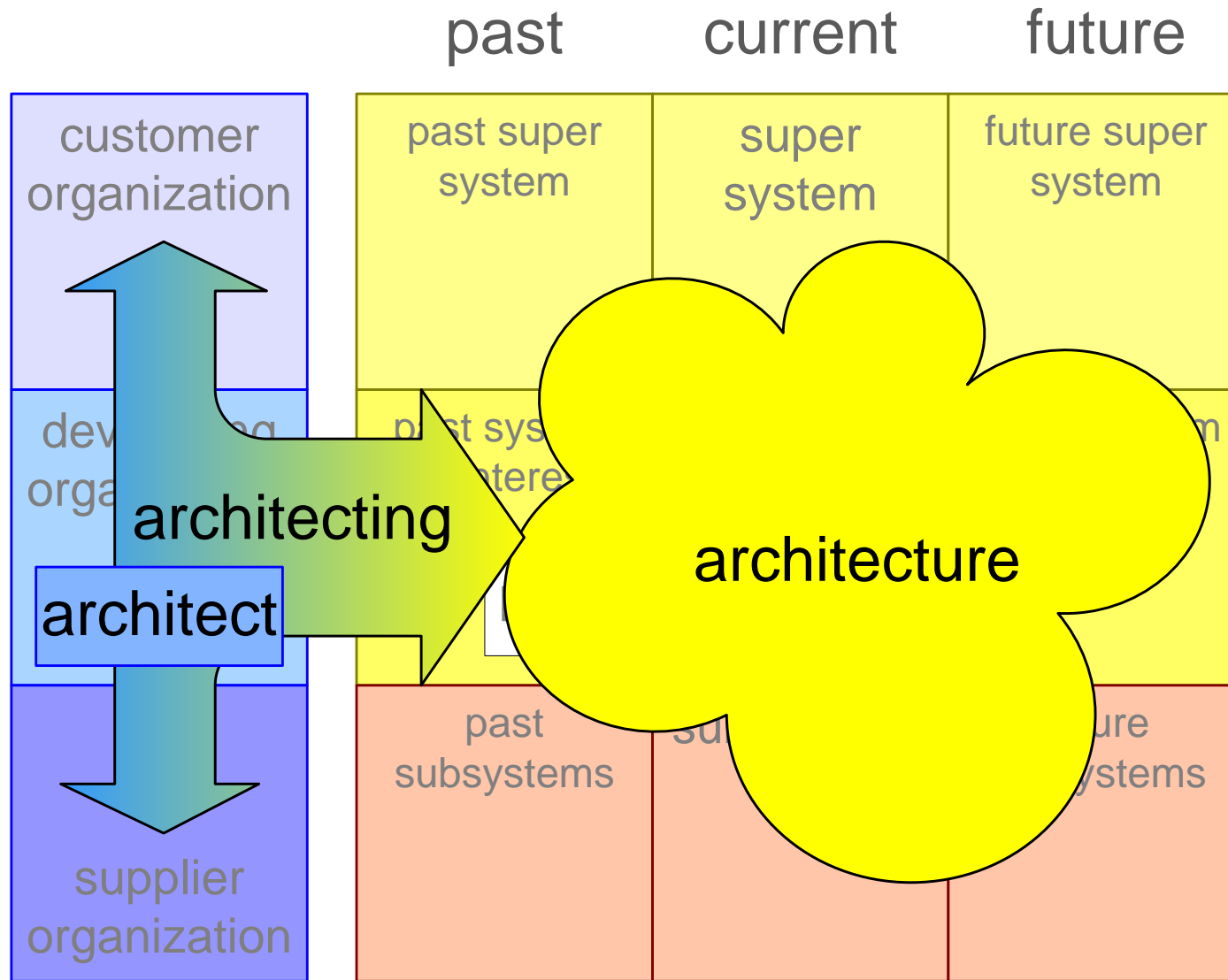


Adding the Time Dimension



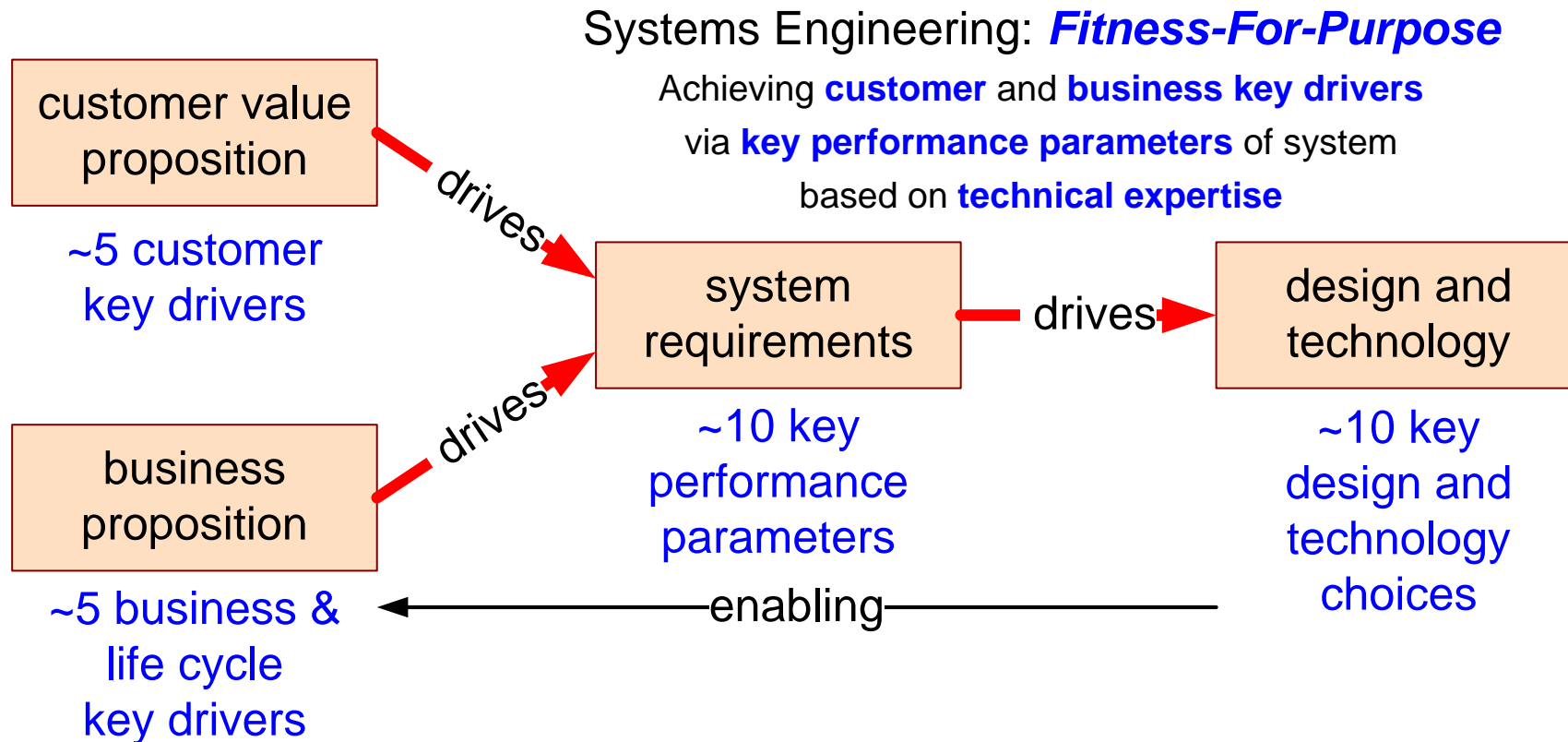
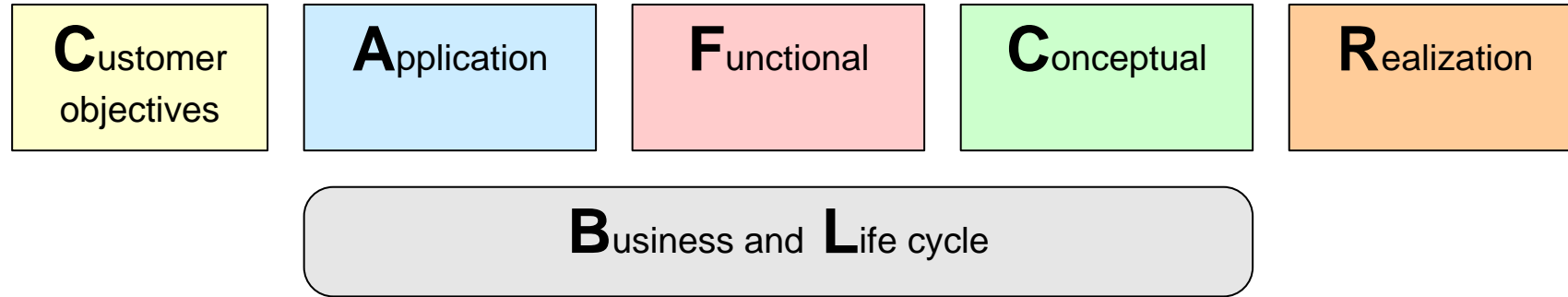
based on TRIZ

Architect, Architecture, Architecting



based on TRIZ

From CAFCR+ to Architecture Essence



Architecture Description

Value Proposition

Why does customer want to buy?

Why do users like to use the system?

customer key drivers	customer stakeholders and concerns
cost of ownership	work flow or ConOps
customer business analysis	et cetera

Business Proposition

How do we earn money?

How do we run a healthy business?

life cycle key drivers	life cycle stakeholders and concerns
business model	life cycle model
cash flow analysis	supply chain

Why

System Specification

What does customer get?

What is the system-of-interest that we deliver?

functions	interfaces
qualities (e.g. quantified performance)	constraints, standards, regulations

What

Design

How will we realize this specification?

How do we ensure performance, safety, robustness, etc.?

partitioning and interfaces	performance models and budgets
dynamic behavior, e.g. functional model	concept and technology selection

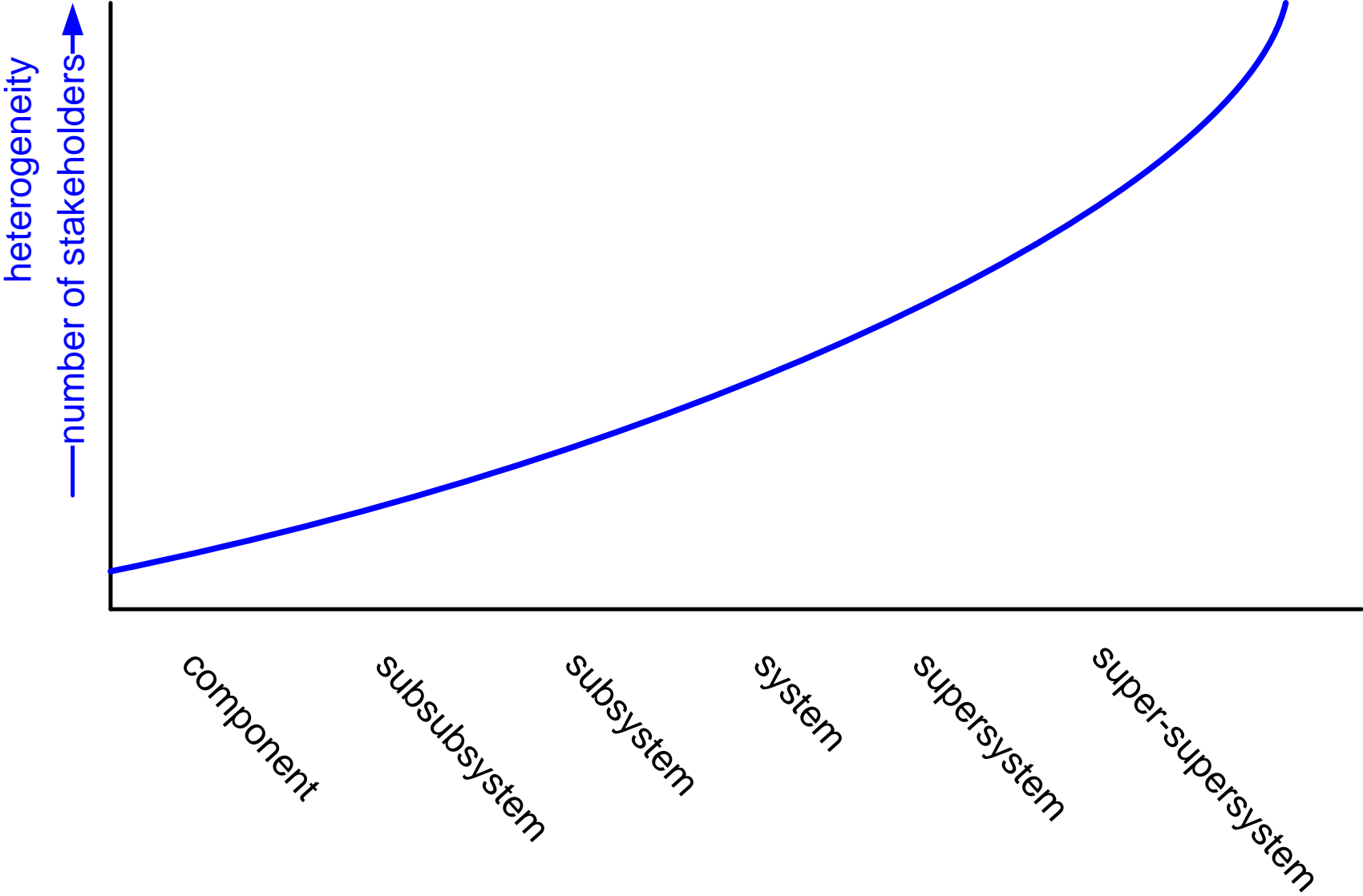
How

Engineering

Getting all details right for all business functions.

technical product documentation

Increasing System Scope, Increasing Stakeholders



Mono-disciplinary engineering

mono-disciplinary
engineering

*software
engineering*

*electrical
engineering*

*mechanical
engineering*

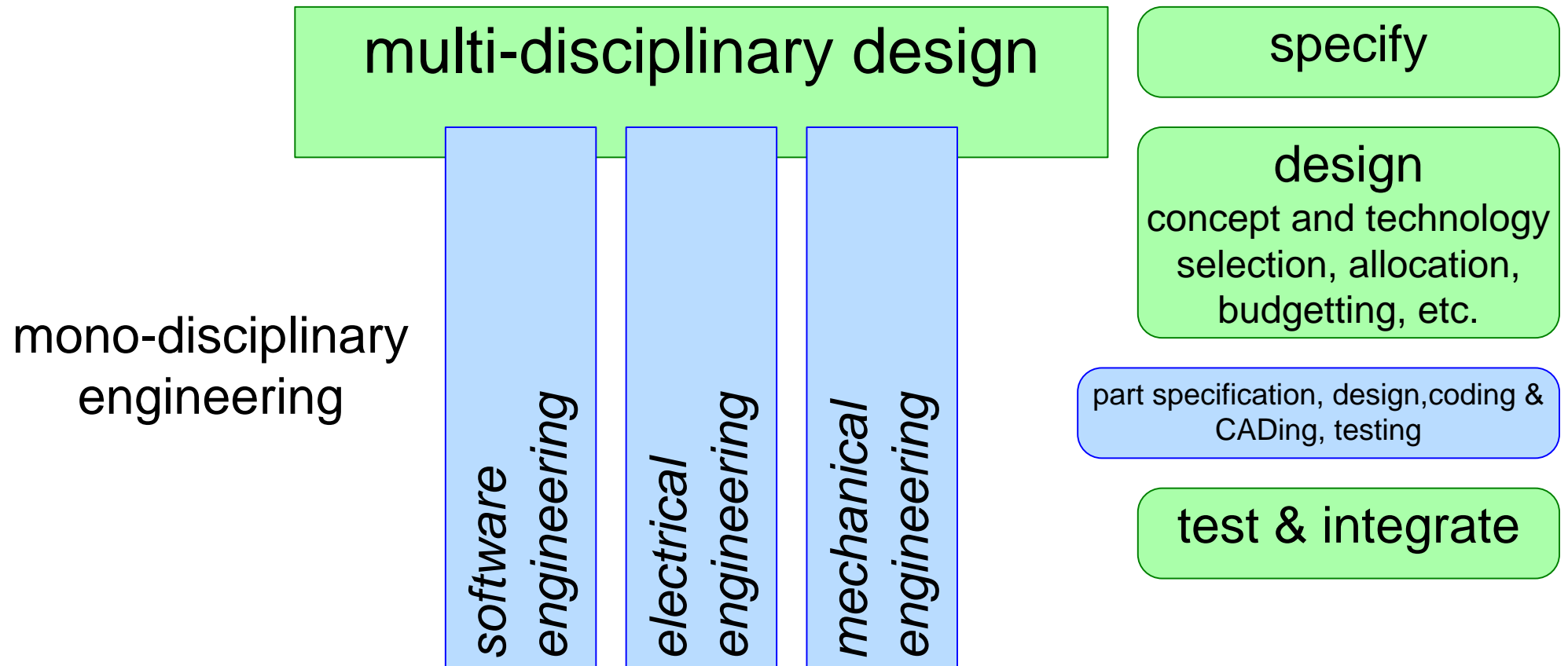
specify

design
model, analyse,
partition, interfaces, etc.

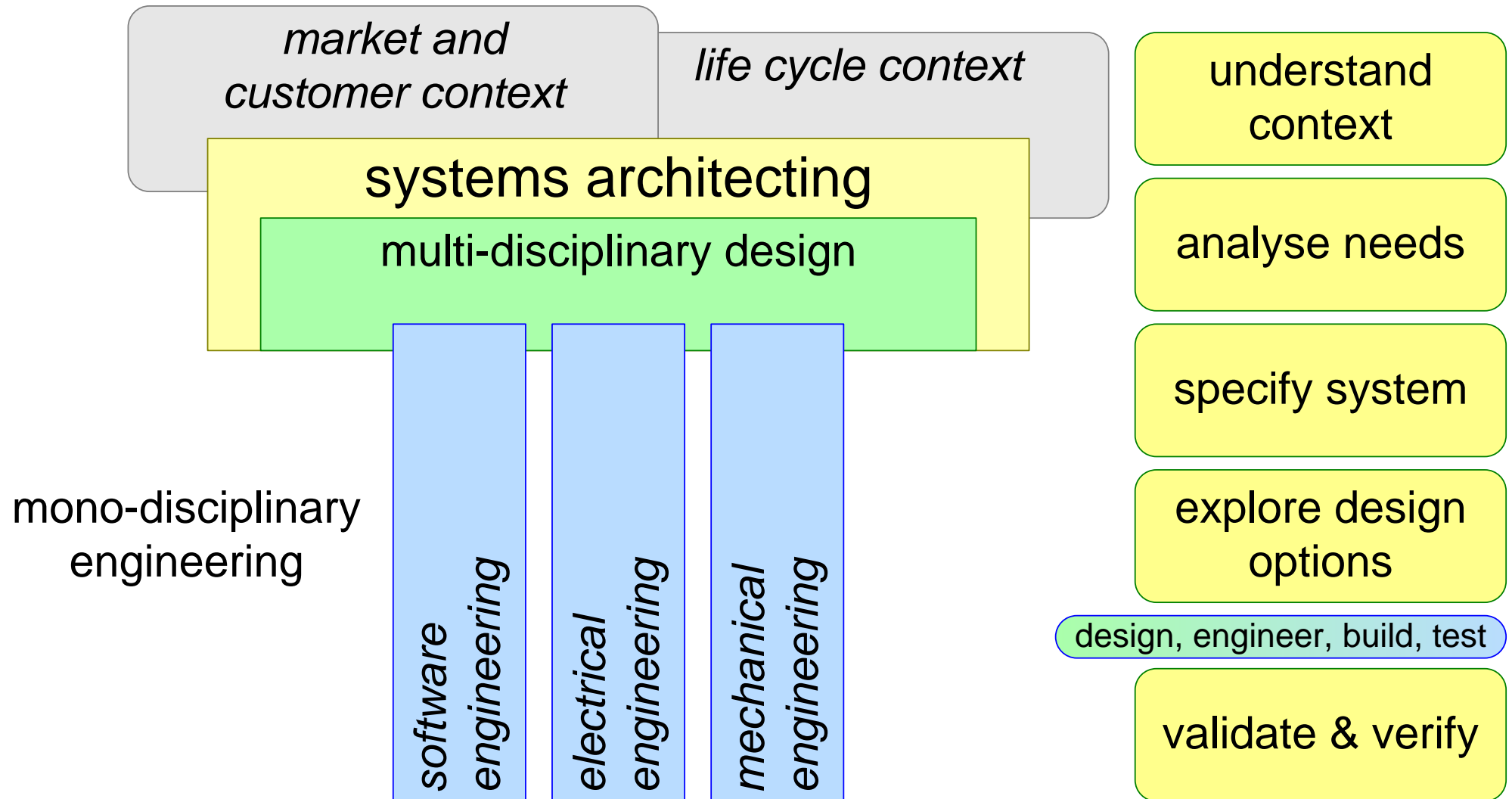
coding & CADing

testing

Multi-disciplinary design and engineering



Architecting: Fit-For-Purpose



Capability Architecting

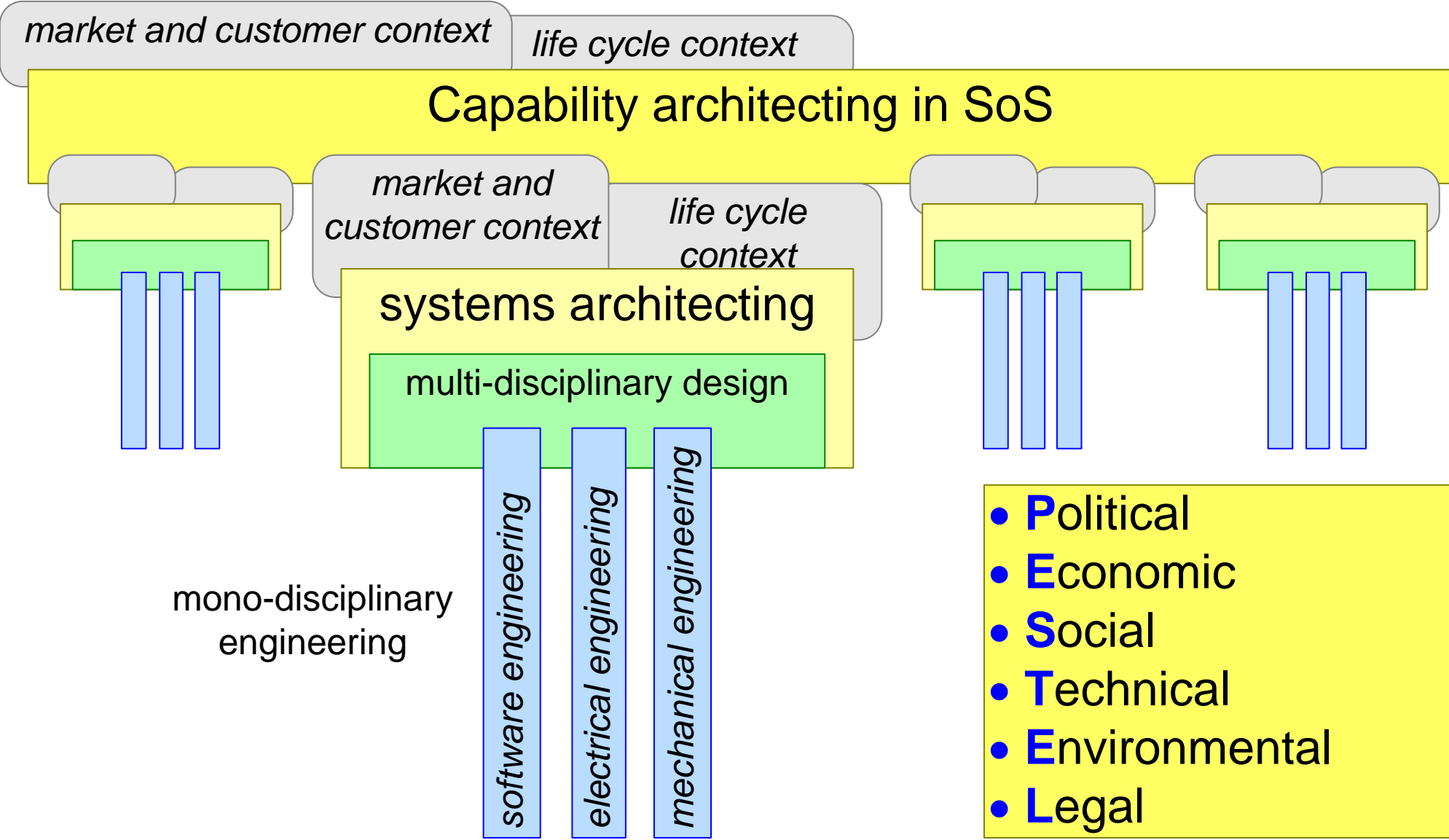
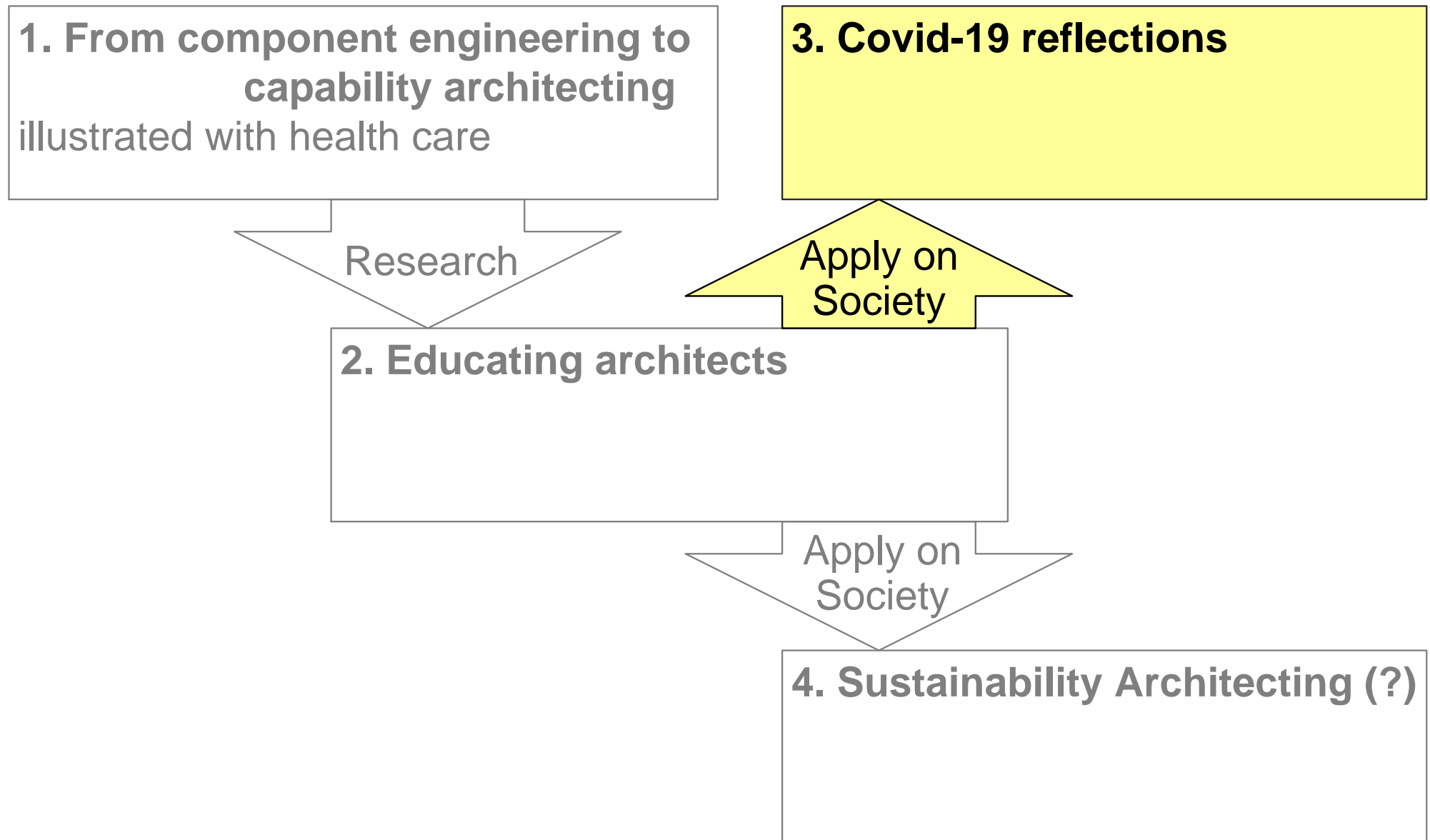


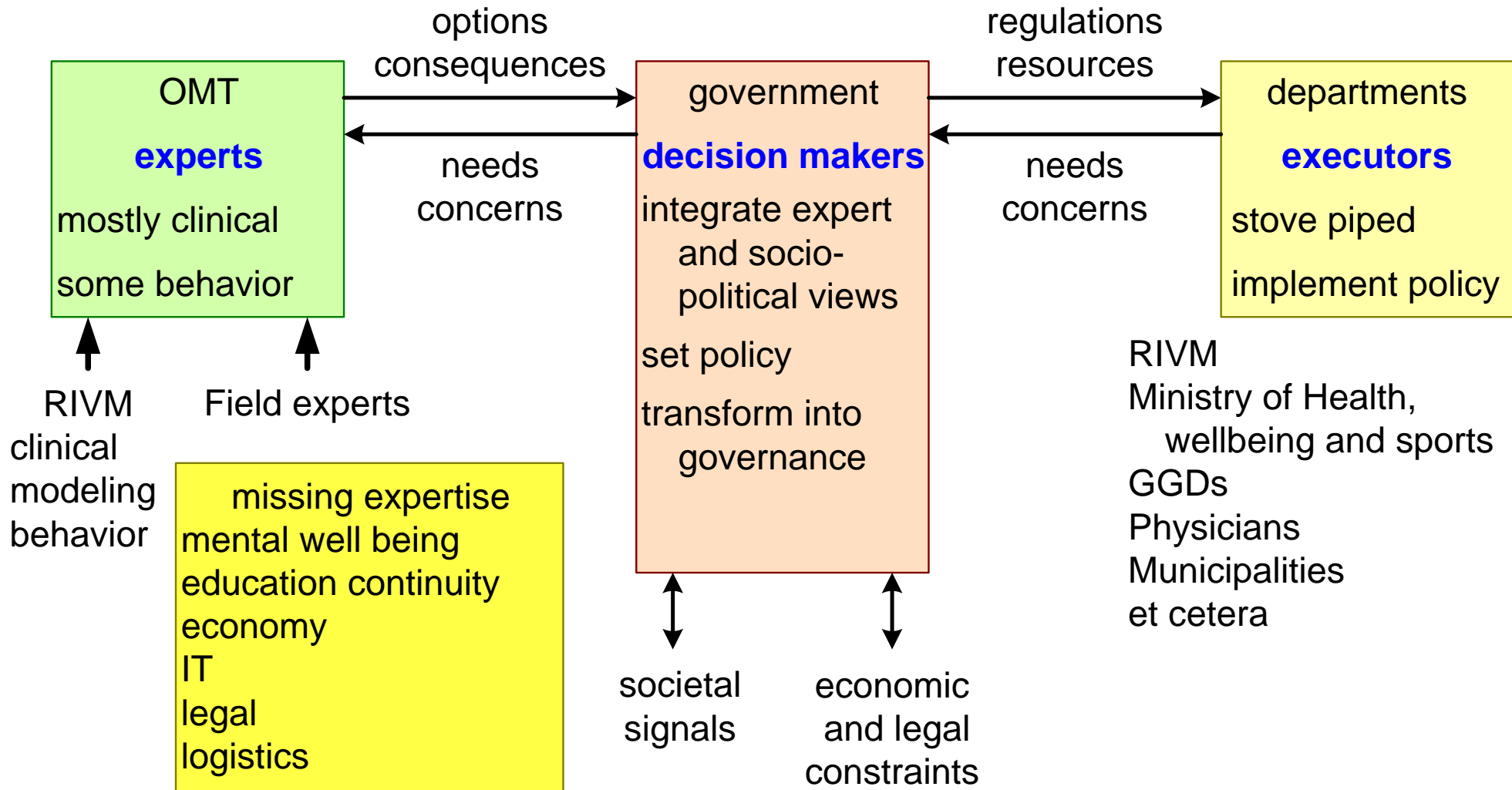
Figure of Content



Observing the Covid-19 Pandemic Response

- The pandemic risk was well known.
- (Western) Societies were unprepared for a pandemic.
- Many systemic problems in **crisis handling**, **problem analysis**, **solution exploration**, and **decision making** became acute
- The poor human capability to understand **exponential growth** and **latency** complicated communication and implementation of measures.
- The IT-support was **unreliable** and **dysfunctional**

Roles in the Pandemic Situation



Who does the Systems Thinking?

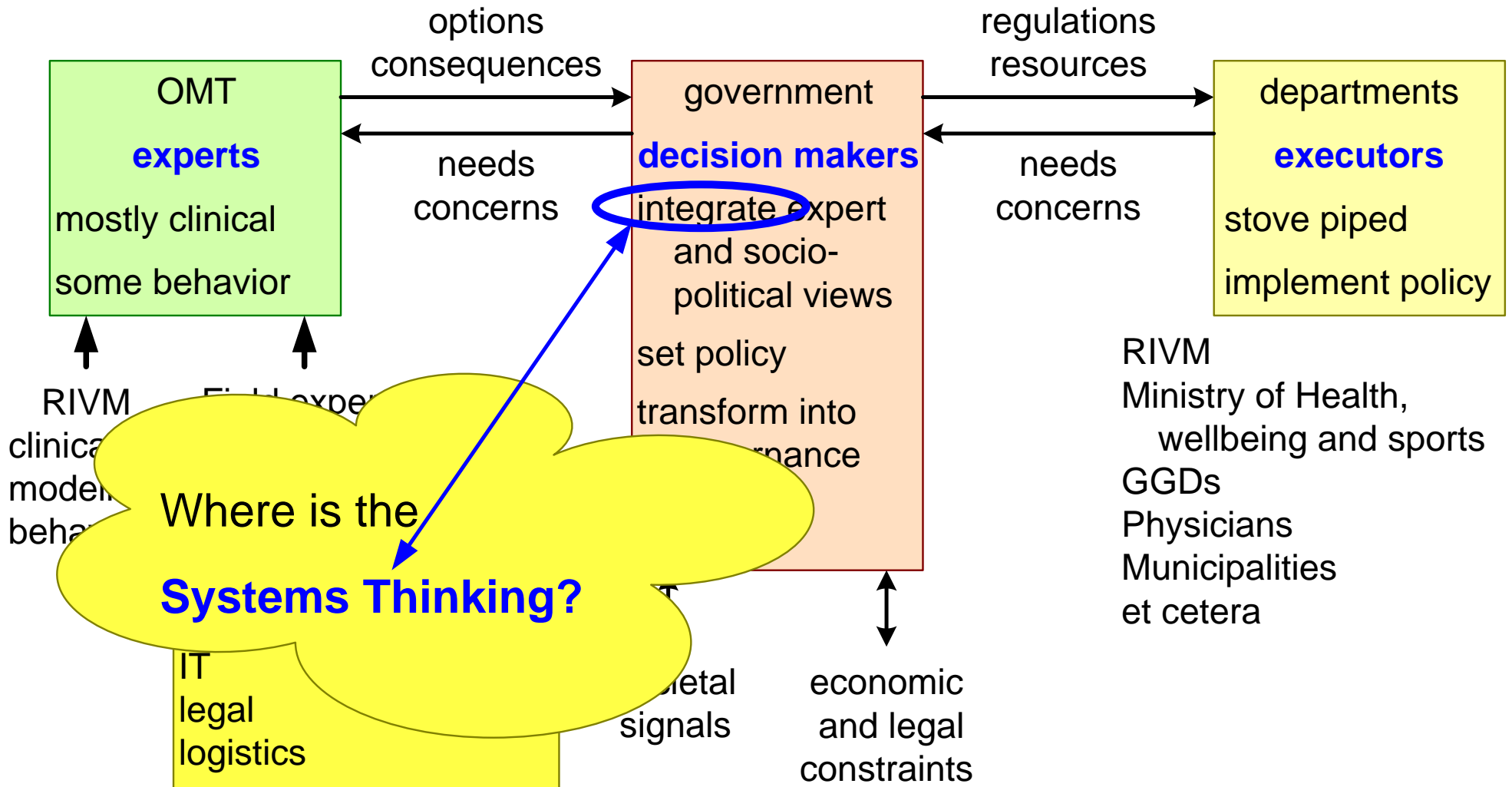


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3. Covid-19 reflections

Research

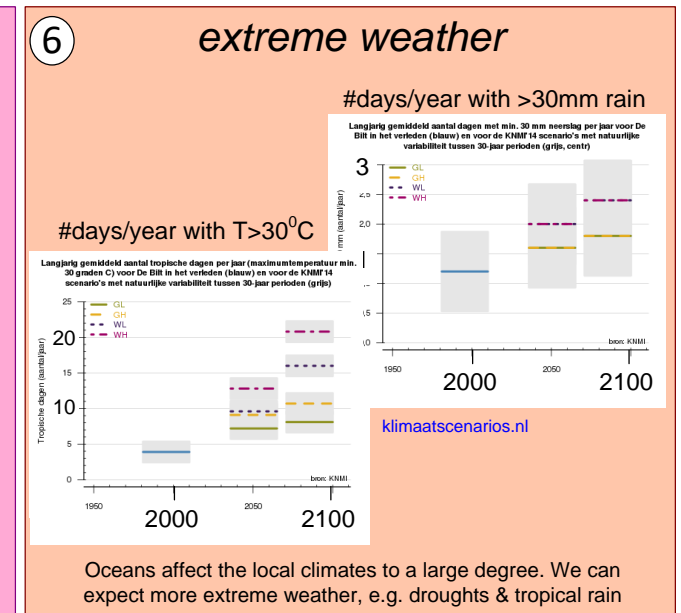
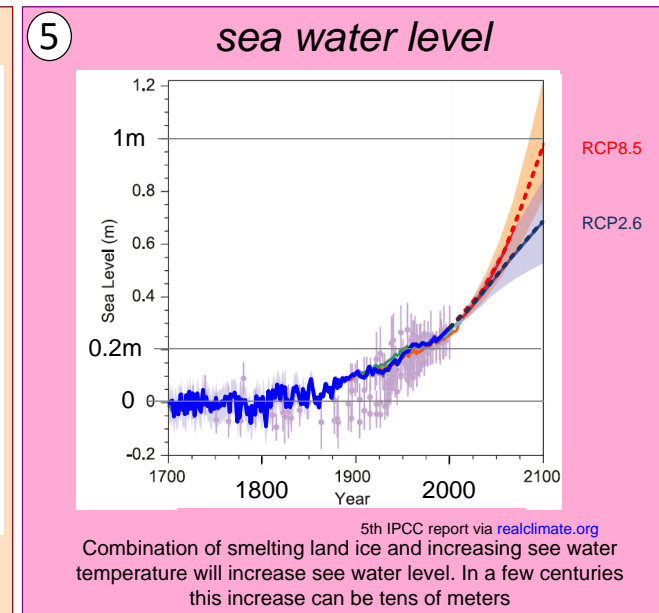
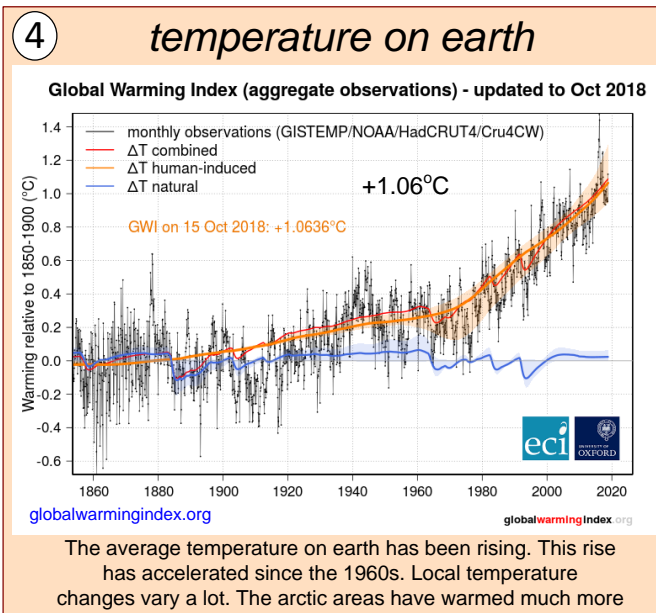
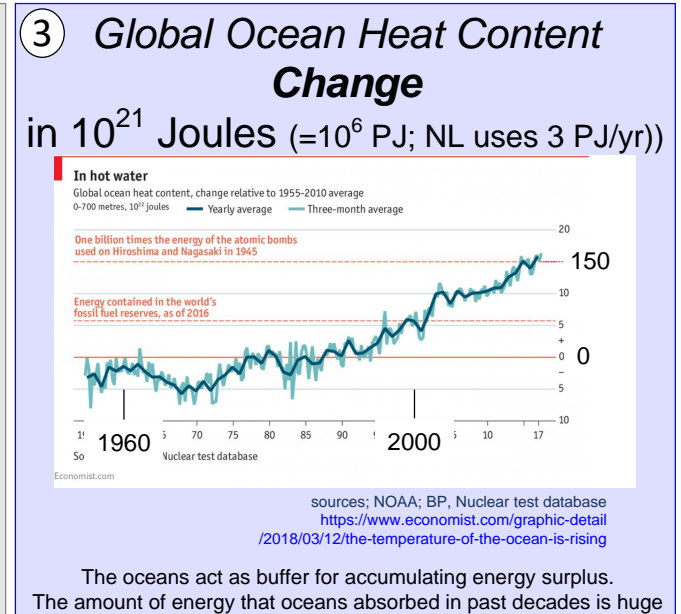
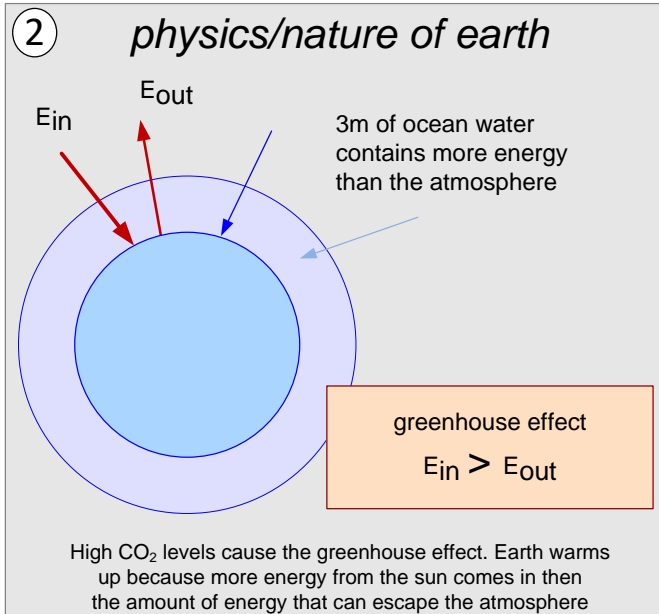
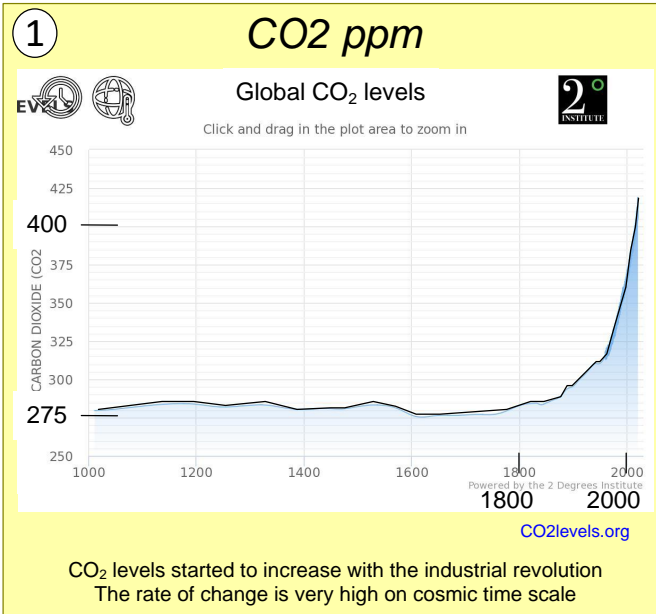
Apply on Society

2. Educating architects

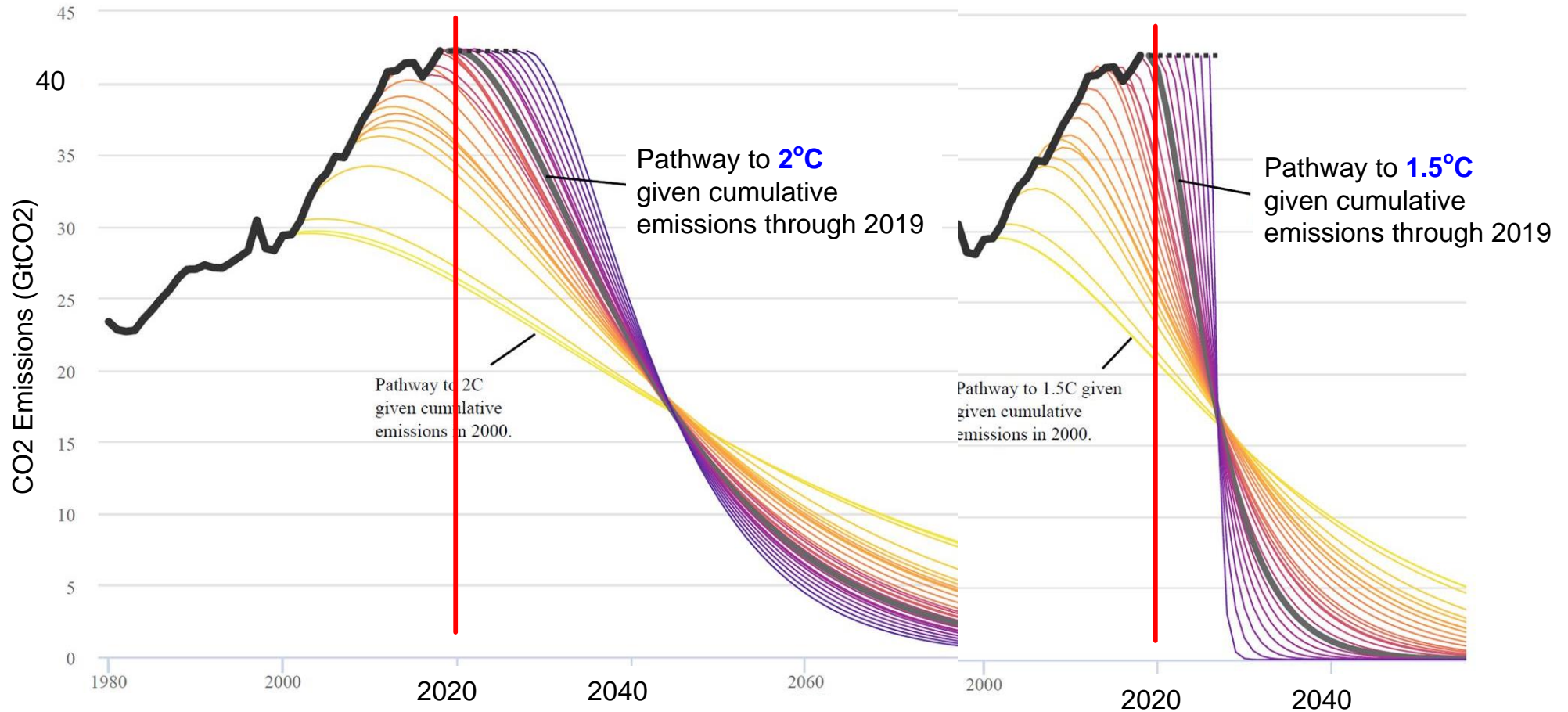
Apply on Society

4. Sustainability Architecting (?)

Climate Change Simplified



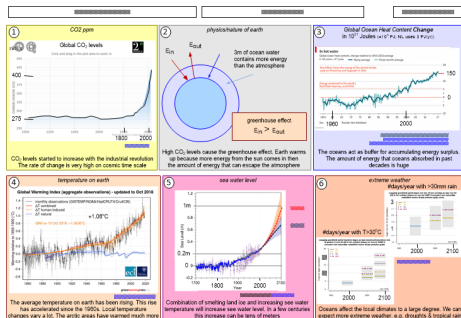
Time is Running Out



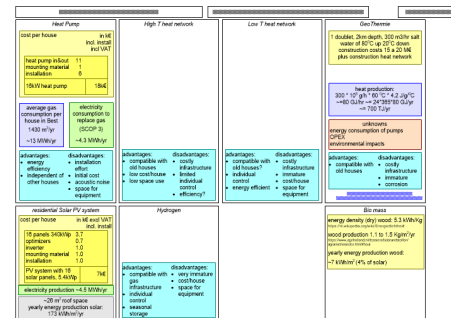
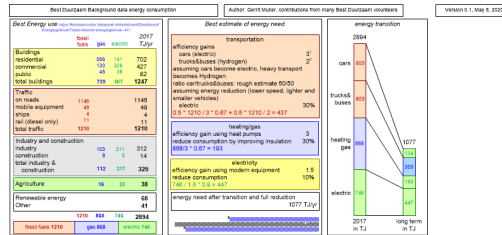
<https://www.carbonbrief.org/unep-1-5c-climate-target-slipping-out-of-reach>

Source: Historical CO₂ emissions from the Global Carbon Project. 1.5C carbon budgets based on the IPCC SR15 report. Original figure from Robbie Andrews. Chart by Carbon Brief using Highcharts.

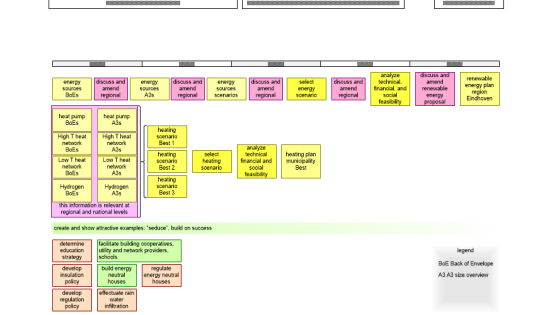
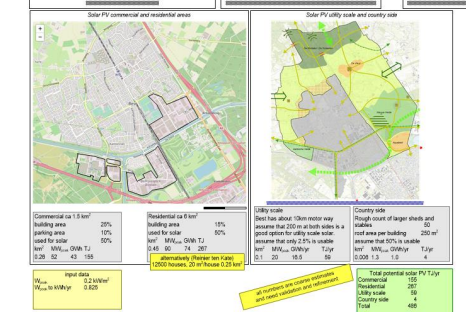
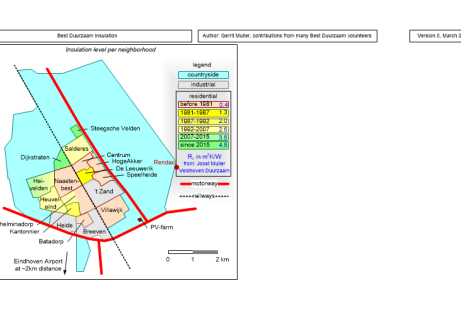
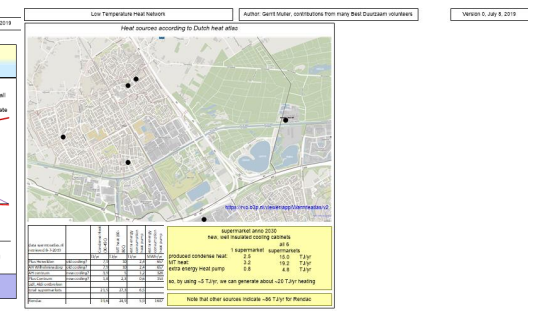
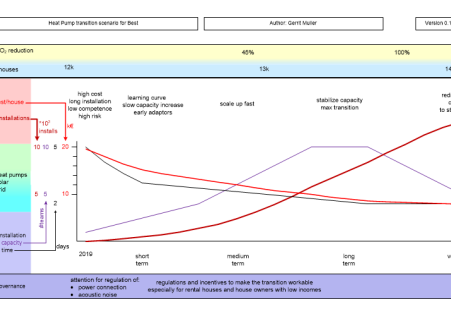
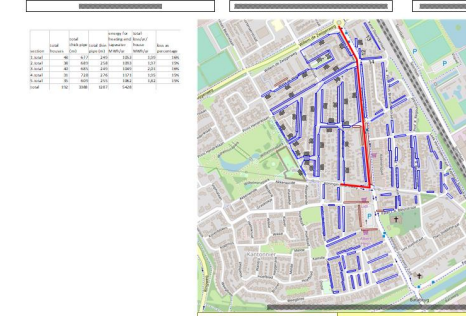
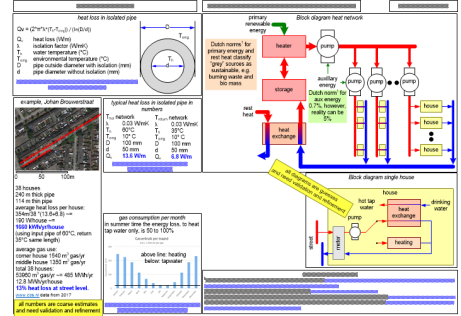
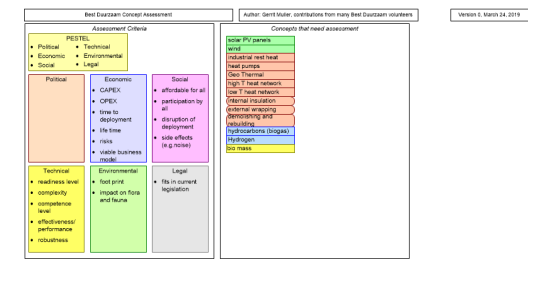
Toward a Roadmap for a Municipality



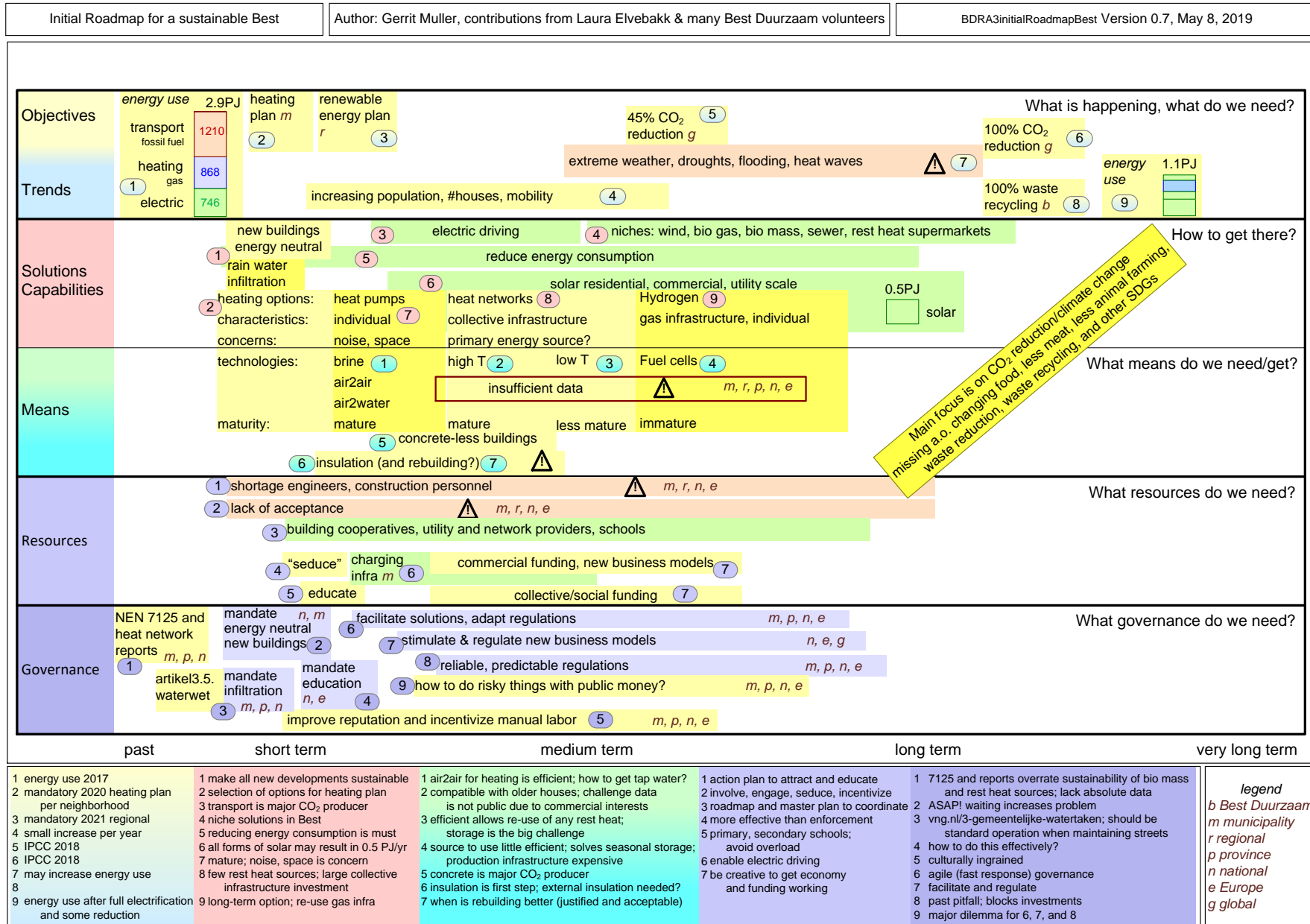
Best Duurzaam A3s to Support the Roadmap Creation



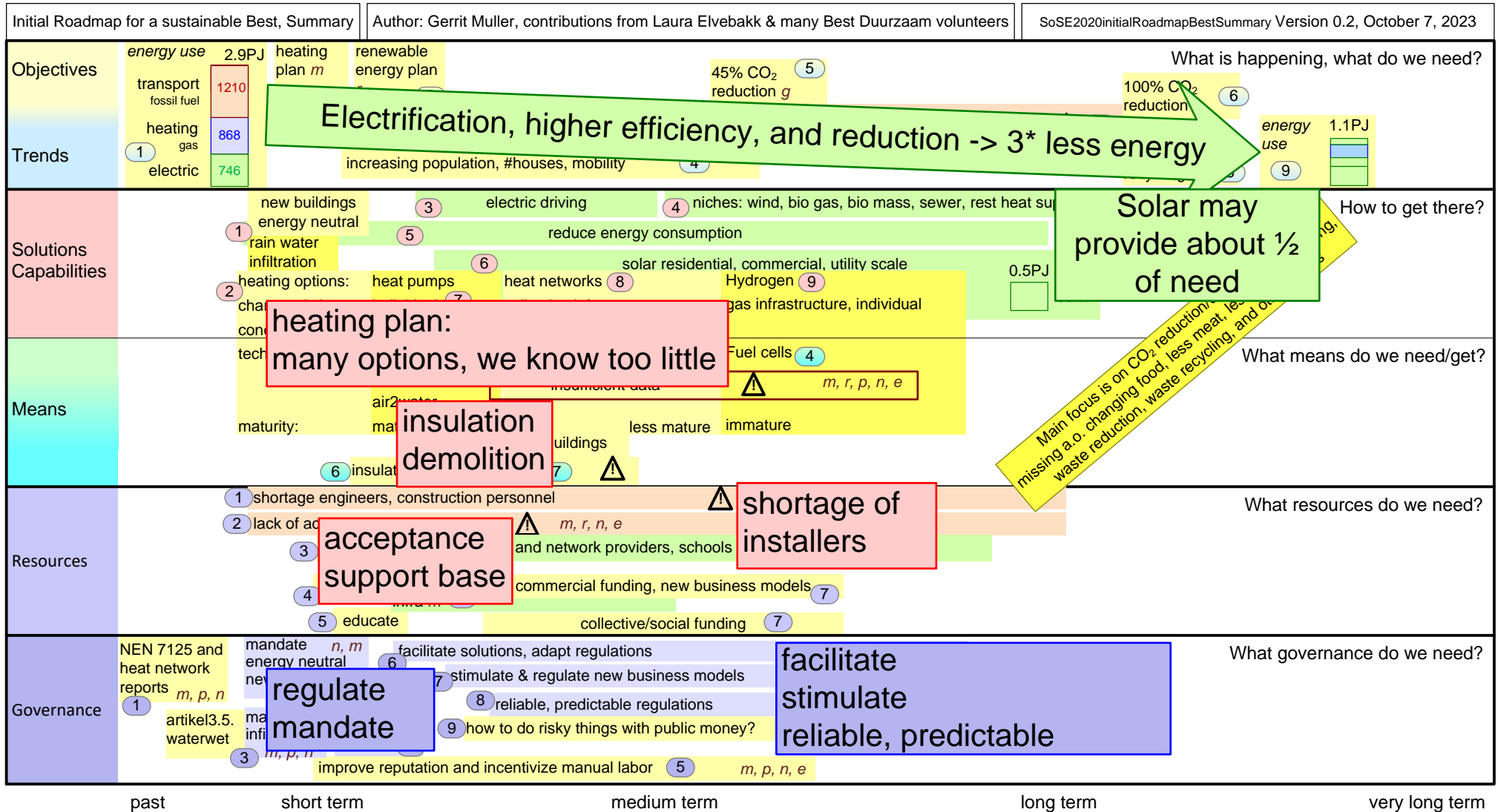
STRRoadmapA3s



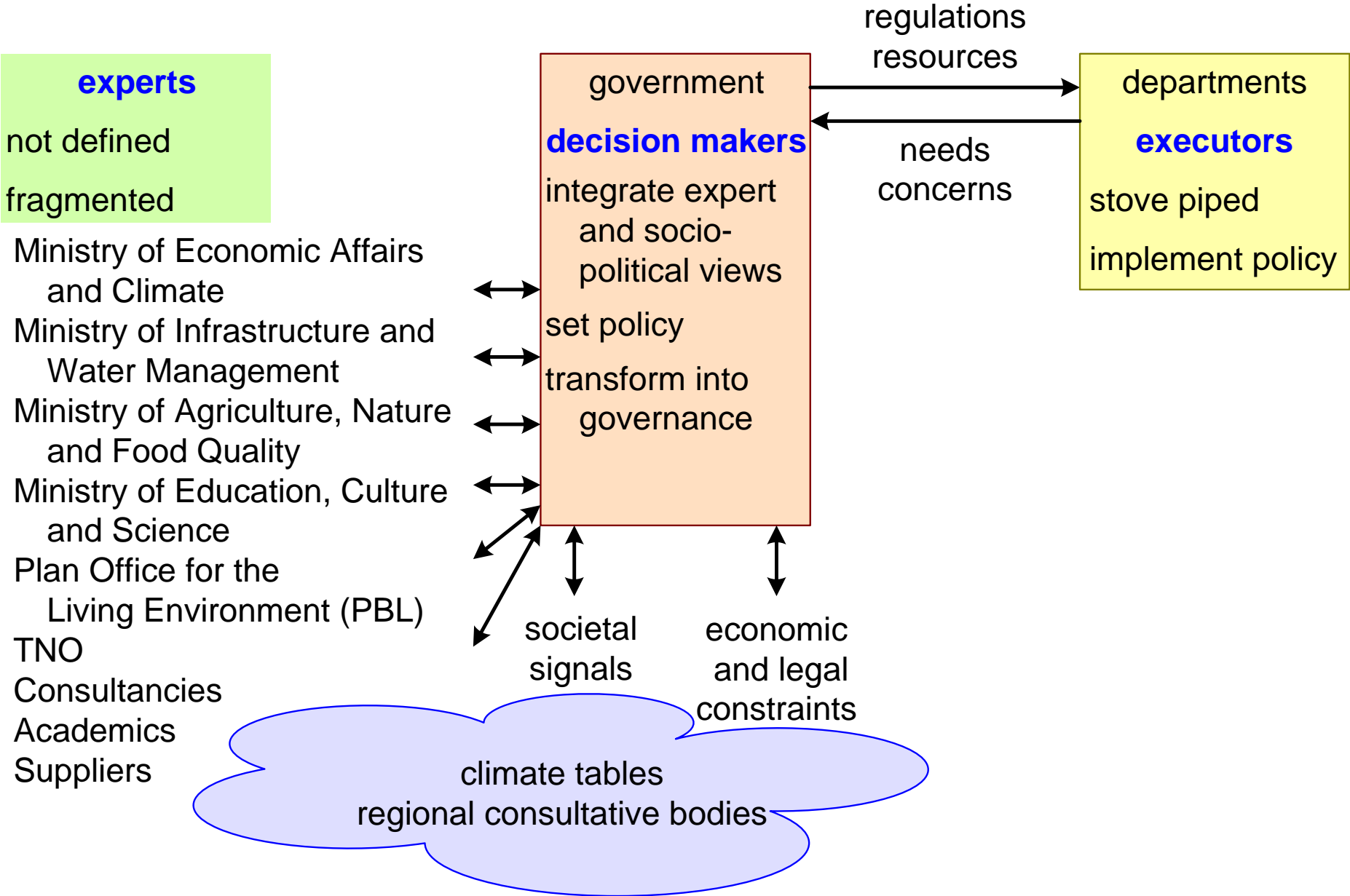
Initial Roadmap: Condensed but still Overwhelming



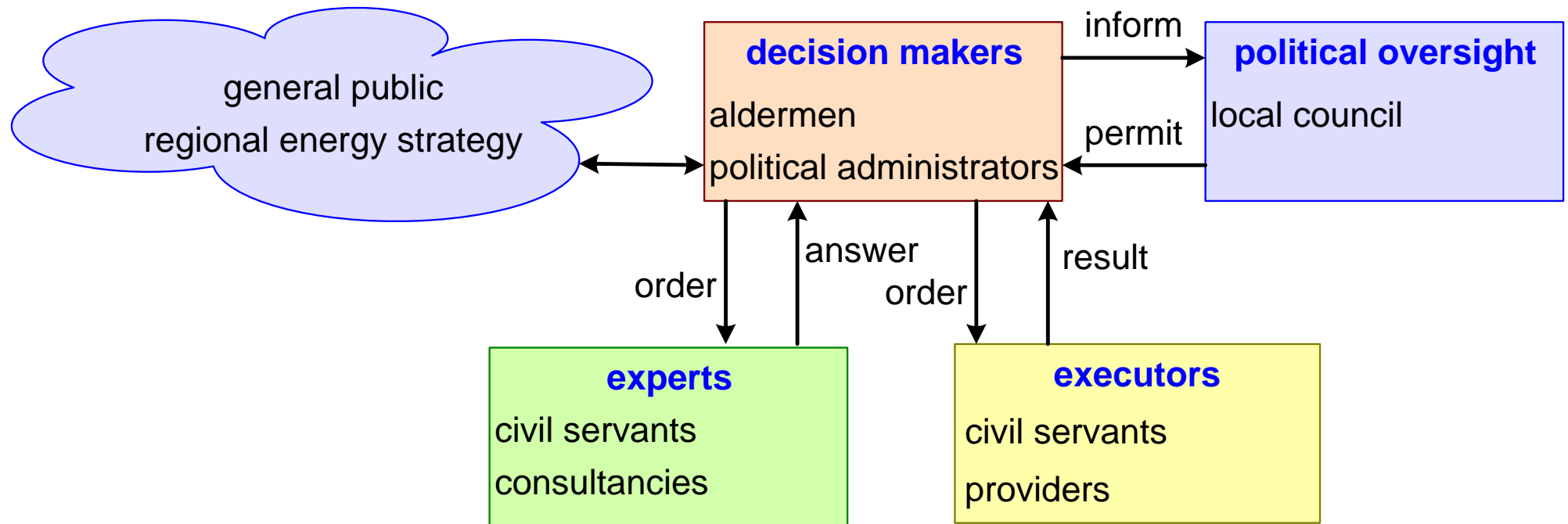
Summary Sustainability Roadmap Best



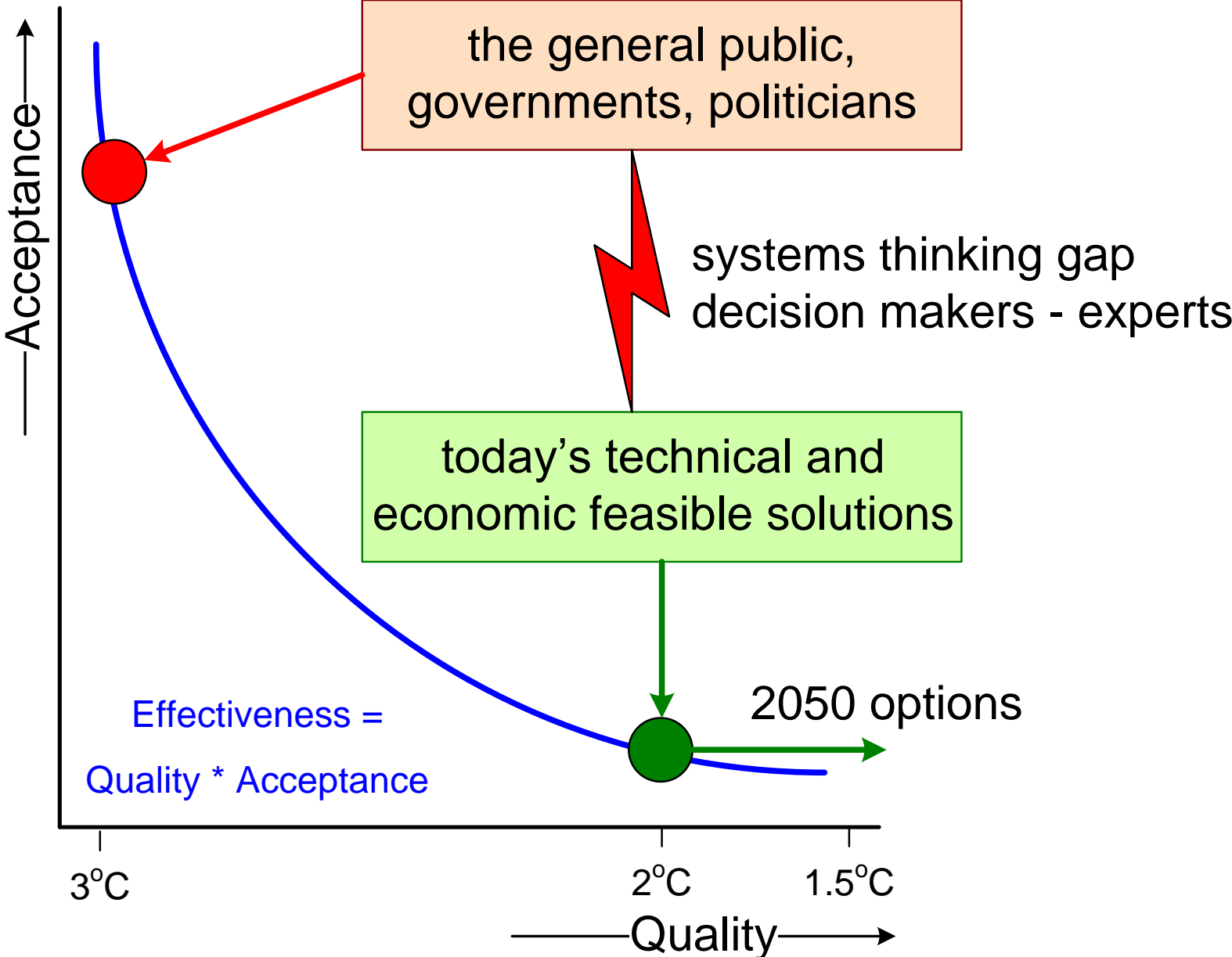
National Sustainability Organization(?)



Local Sustainability Organization(?)



Solutions are Known, the Leadership is Missing



From Past to Future

