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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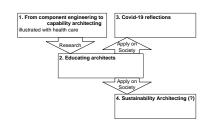
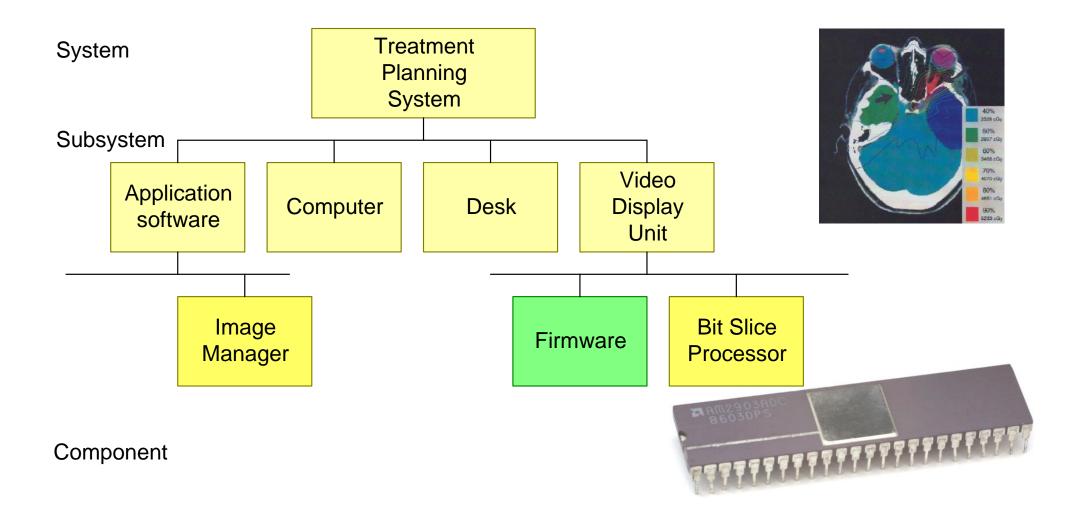


Figure of Content

1. From component engineering to 3. Covid-19 reflections capability architecting illustrated with health care Apply on Research Society 2. Educating architects Apply on Society 4. Sustainability Architecting (?)

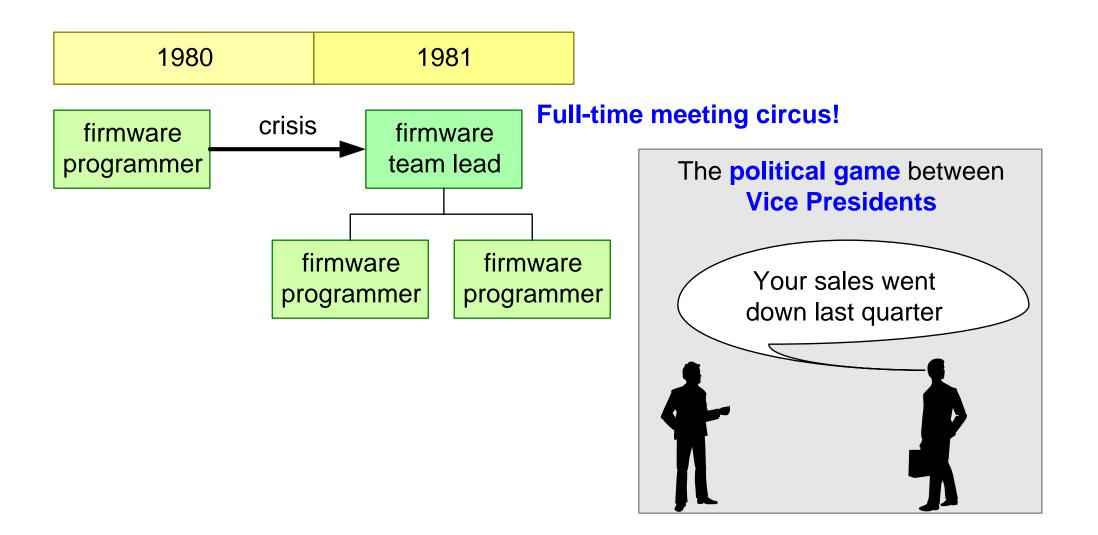


Firmware for Treatment Planning



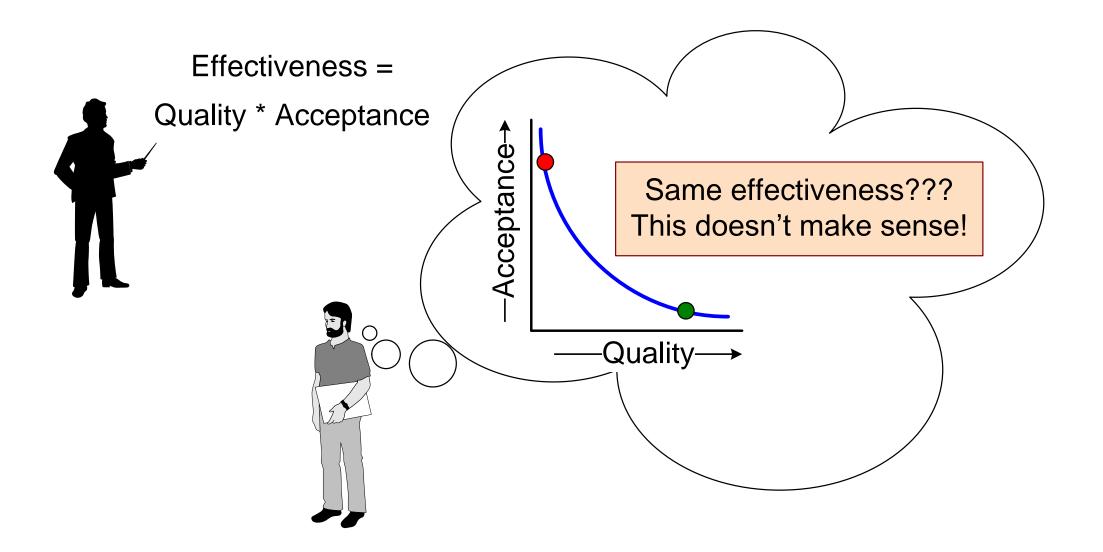


From programmer to Team Leader



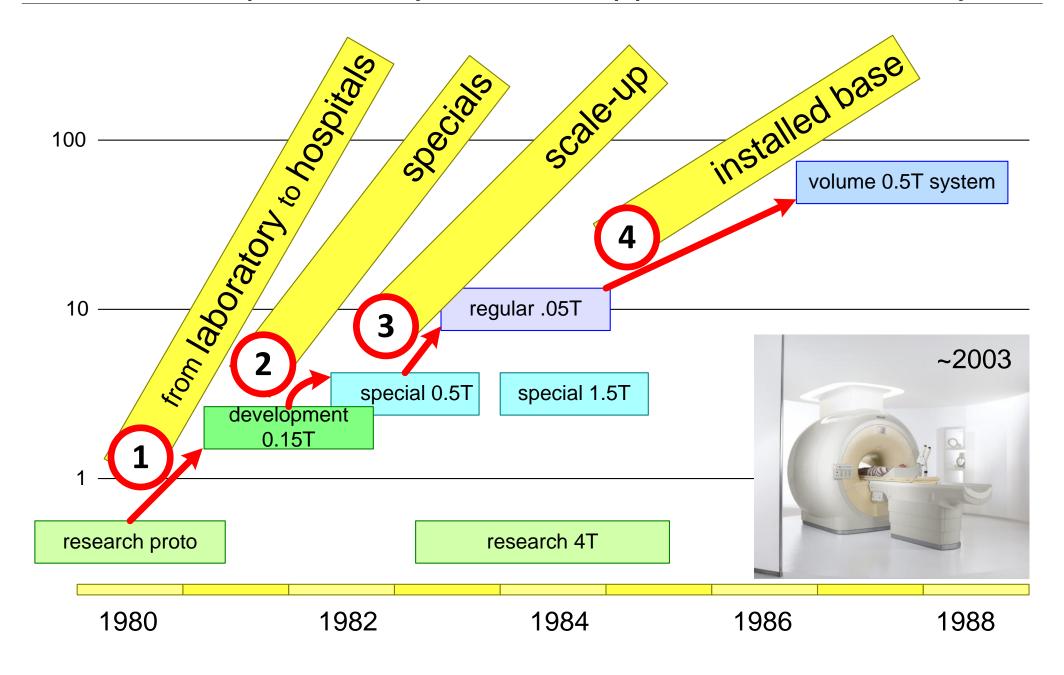


The Organization and Efficiency Expert



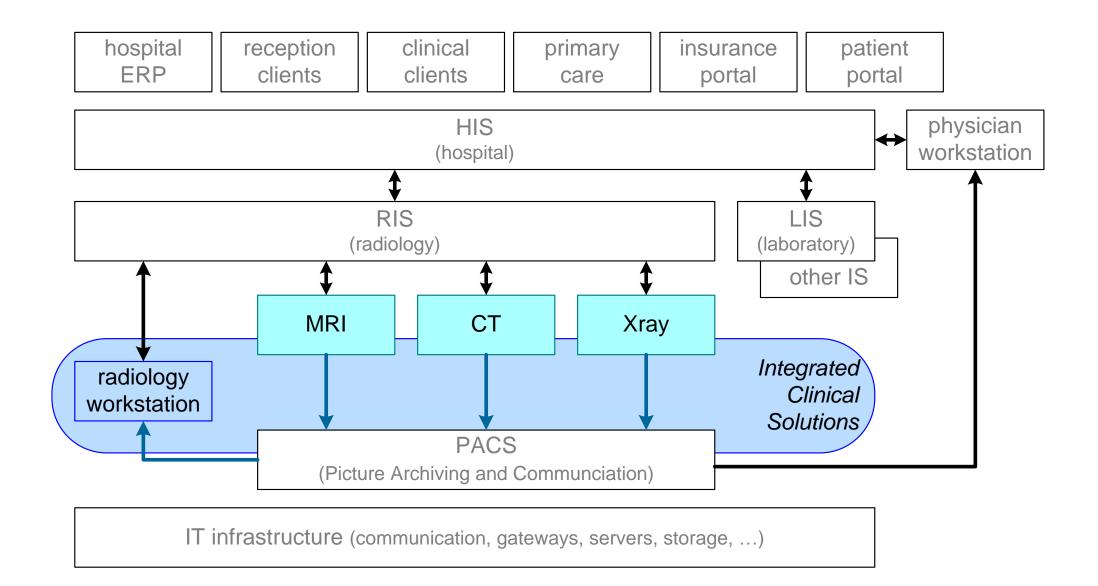


Architect Scope: The System, Its Application and Life Cycle





Toward Systems of Systems





Toward(?) Digital Infrastructure

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

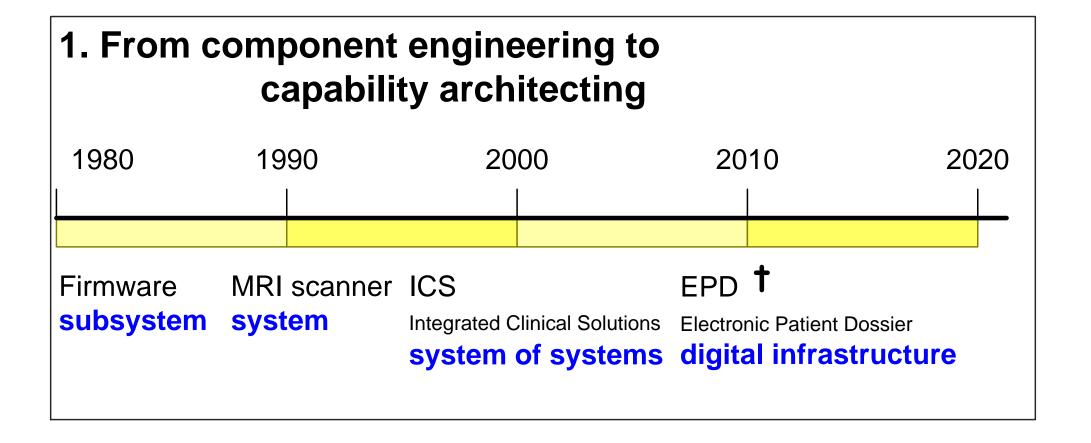




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Our Primary Interest

developing organization

architect

system of interest



Context, Zoom-out and Zoom-in

customer organization

developing organization

architect

supplier organization

super system

system of interest

subsystems



Adding the Time Dimension

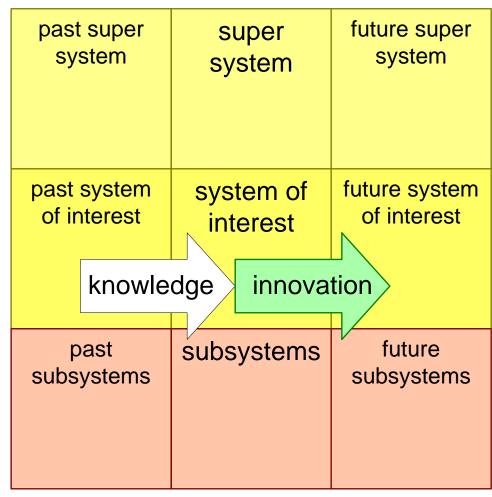
past current future

customer organization

developing organization

architect

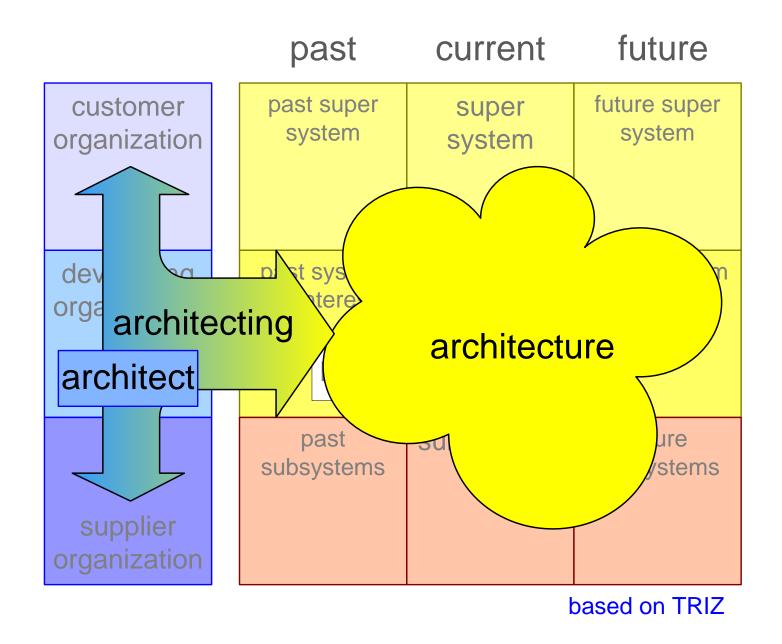
supplier organization



based on TRIZ



Architect, Architecture, Architecting

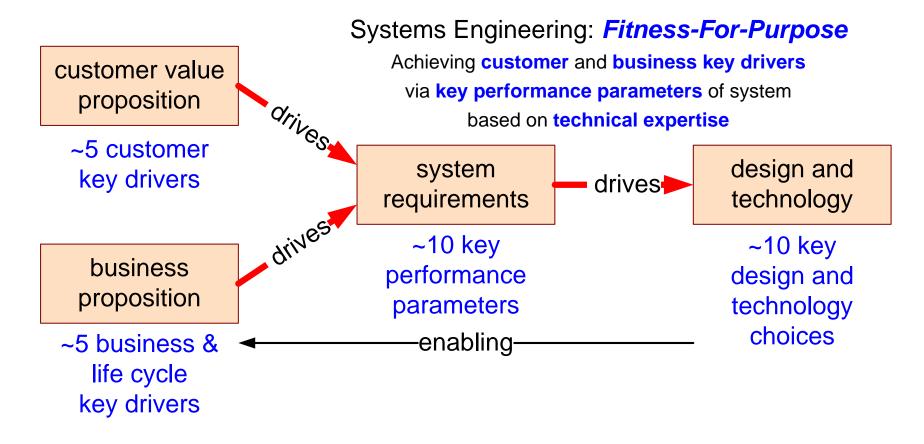


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SEMABarchitecting

From CAFCR+ to Architecture Essence

Functional Realization Conceptual Customer **A**pplication objectives Business and Life cycle





Architecture Description

Value Proposition
Why does customer want to buy?
Why do users like to use the system?

customer key drivers cost of ownership customer business analysis customer stakeholders and concerns work flow or ConOps et cetera Business Proposition
How do we earn money?
How do we run a healthy business?

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

What

System Specification

What does customer get?

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

functions qualities (e.g. quantified performance)

interfaces constraints, standards, regulations

Design

How will we realize this specification?

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

partitioning and interfaces dynamic behavior, e.g. functional model

performance models and budgets concept and technology selection

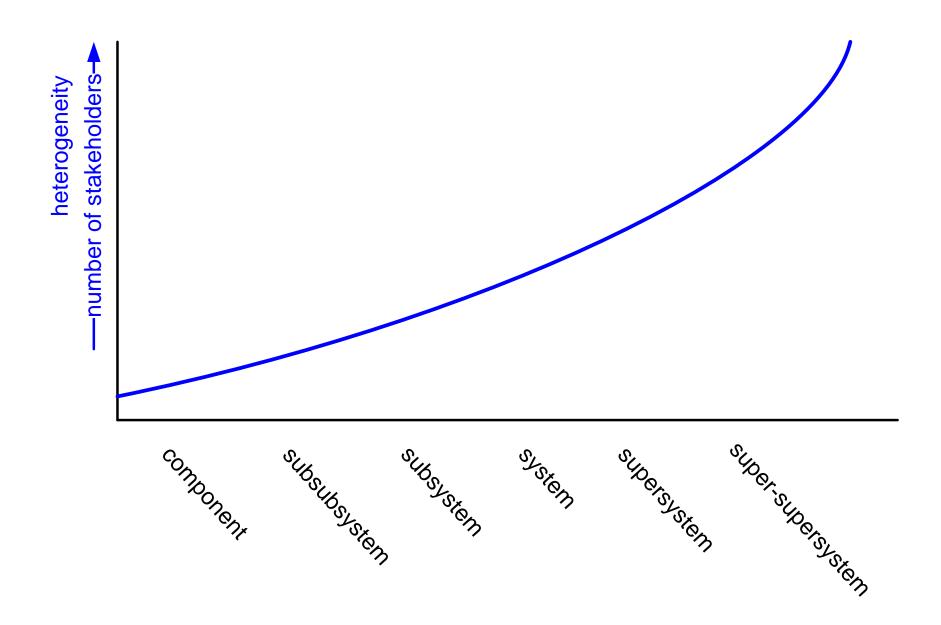
How

Engineering
Getting all details right for all business functions.

technical product documentation



Increasing System Scope, Increasing Stakeholders





Mono-disciplinary engineering

mono-disciplinary engineering

engineering

electrical engineering mechanical engineering specify

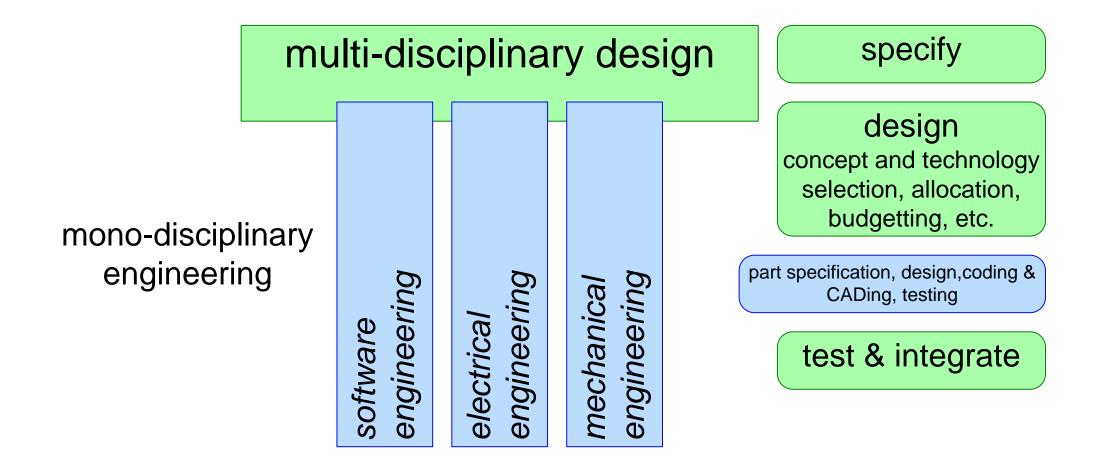
design
model, analyse,
partition, interfaces, etc.

coding & CADing

testing

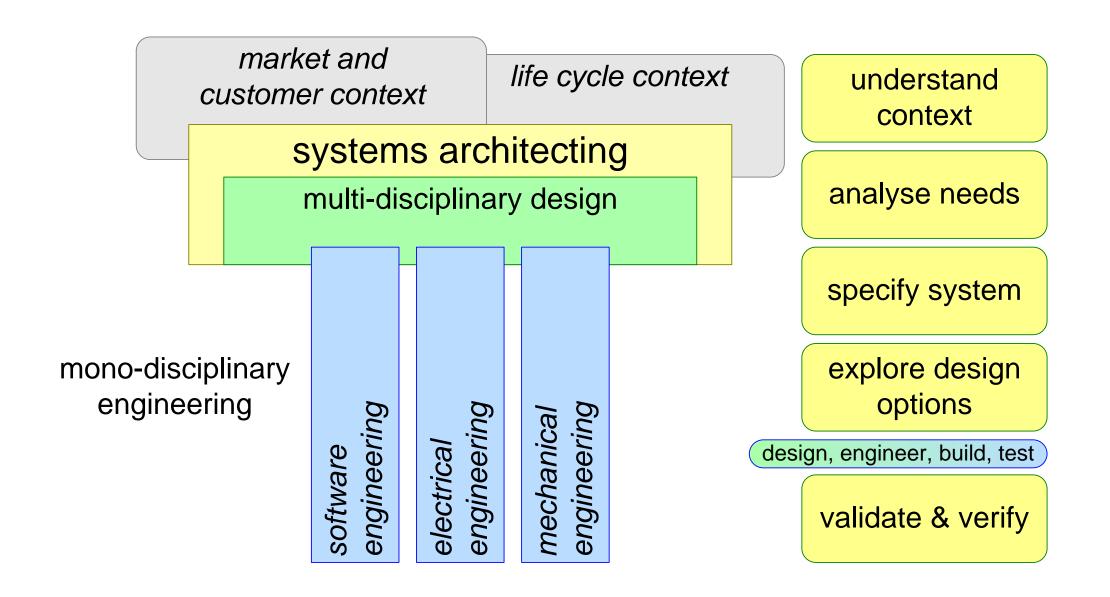


Multi-disciplinary design and engineering





Architecting: Fit-For-Purpose





Capability Architecting

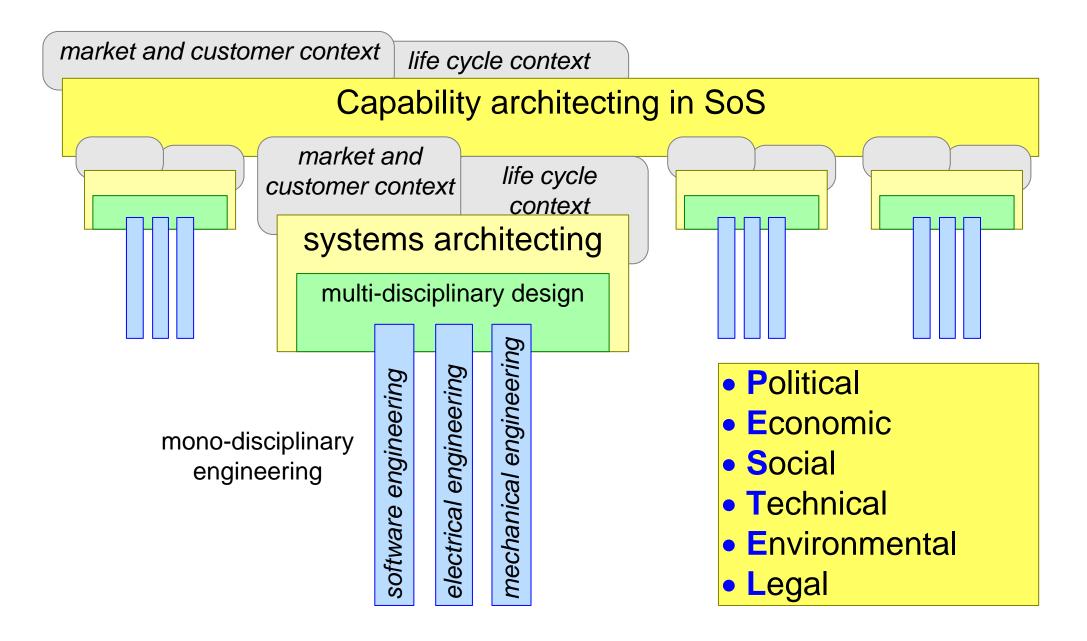




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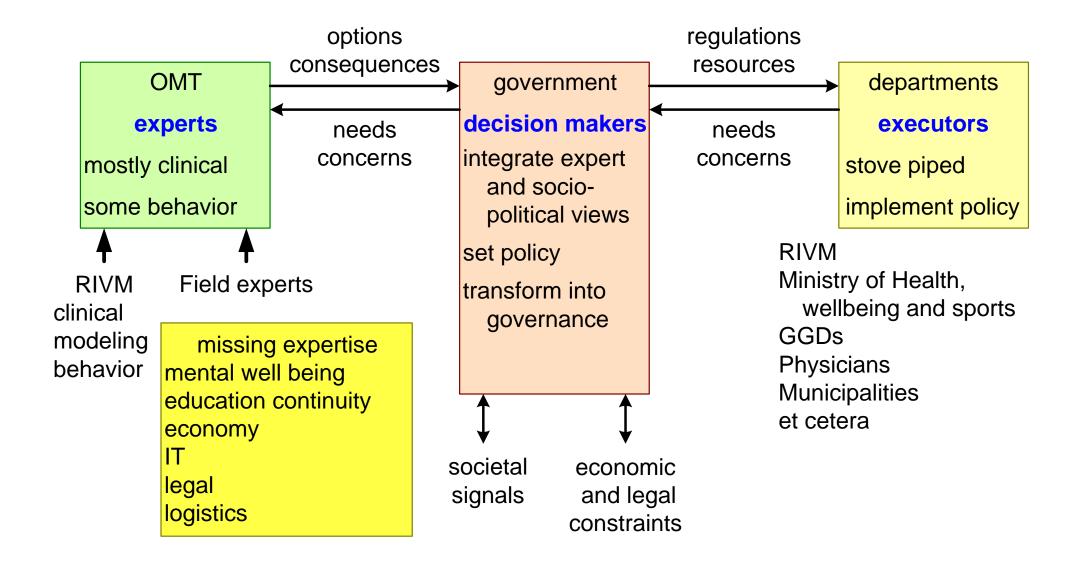


Observing the Covid-19 Pandemic Response

- 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?

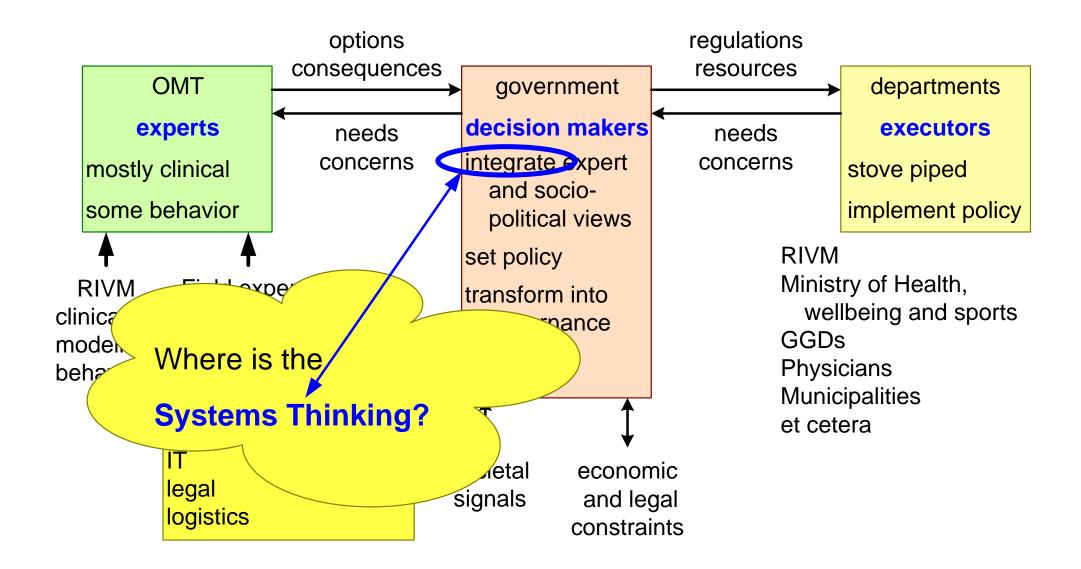


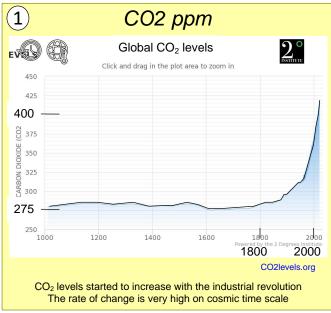


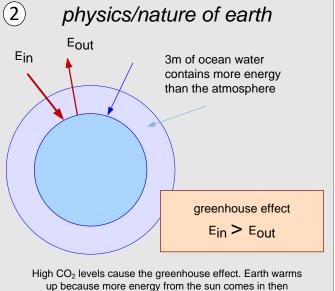
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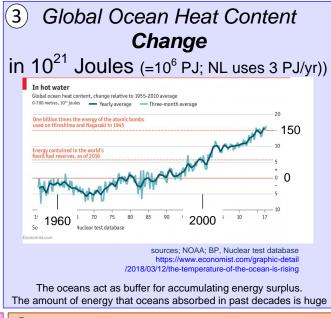


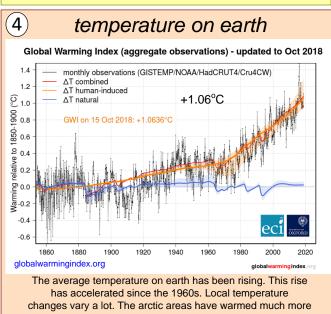
Climate Change Simplified

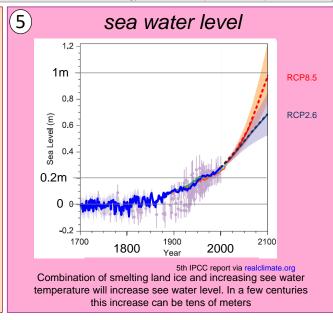


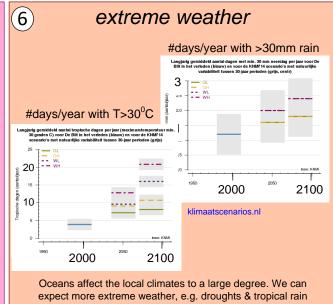


the amount of energy that can escape the atmosphere

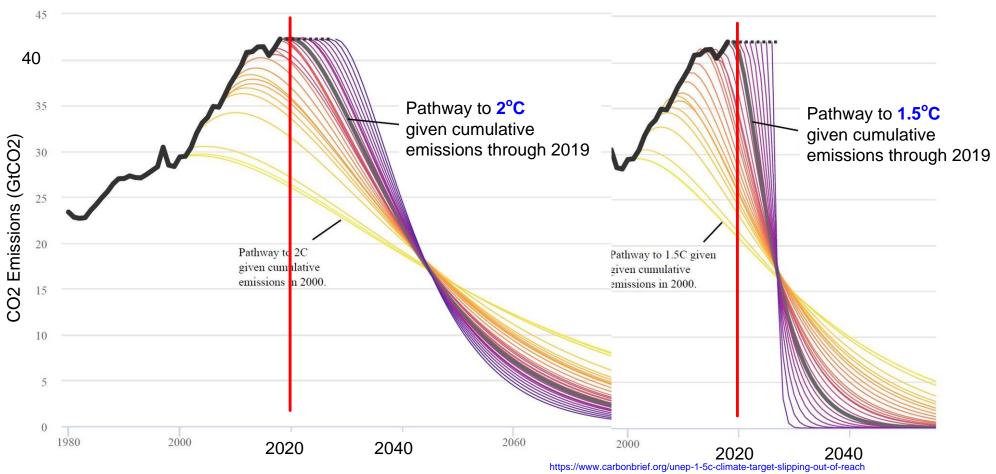








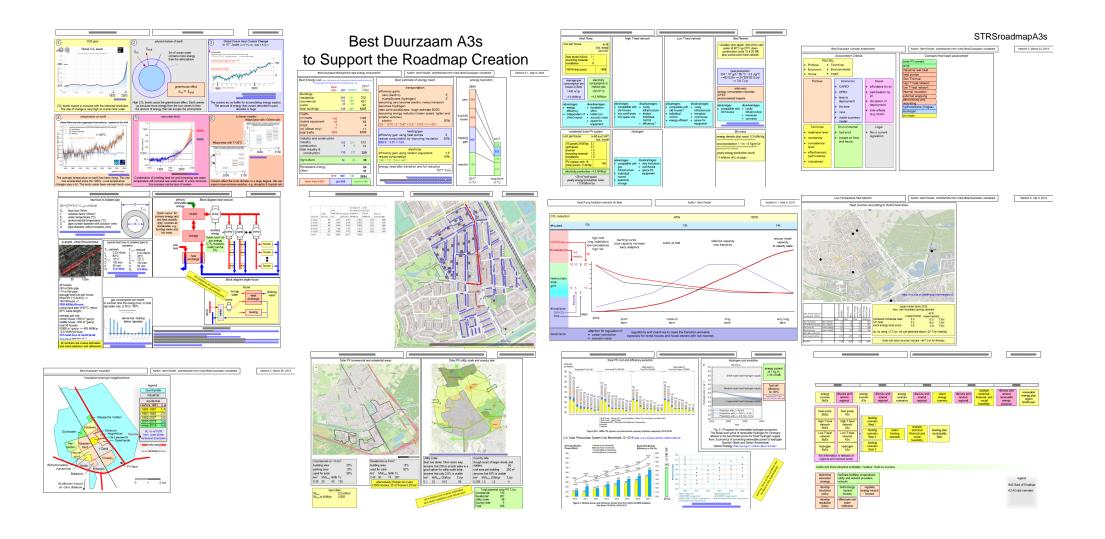
Time is Running Out



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.

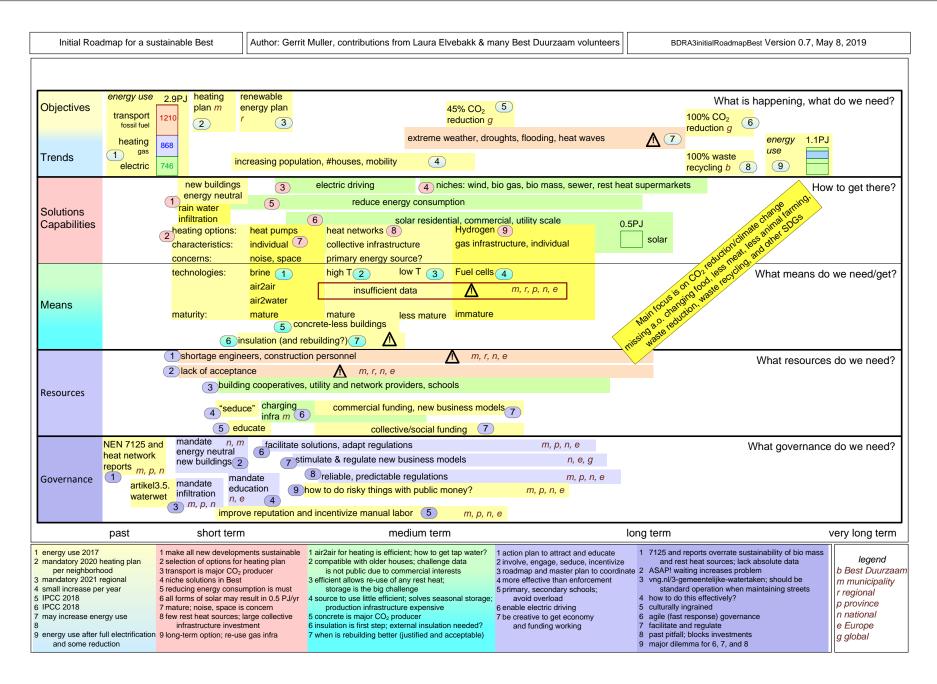


Toward a Roadmap for a Municipality



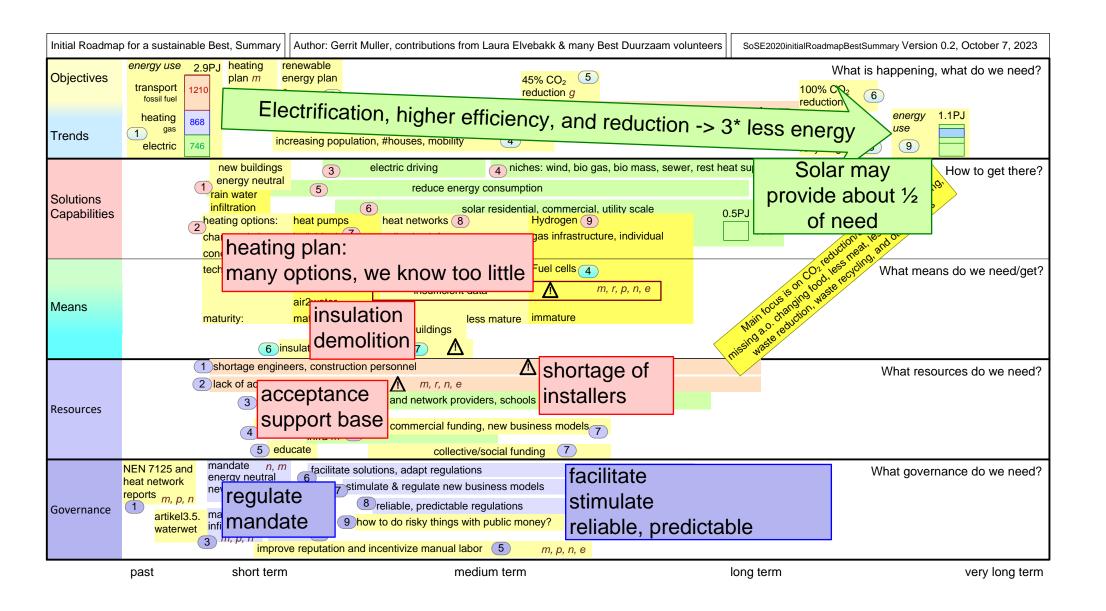


Initial Roadmap: Condensed but still Overwhelming



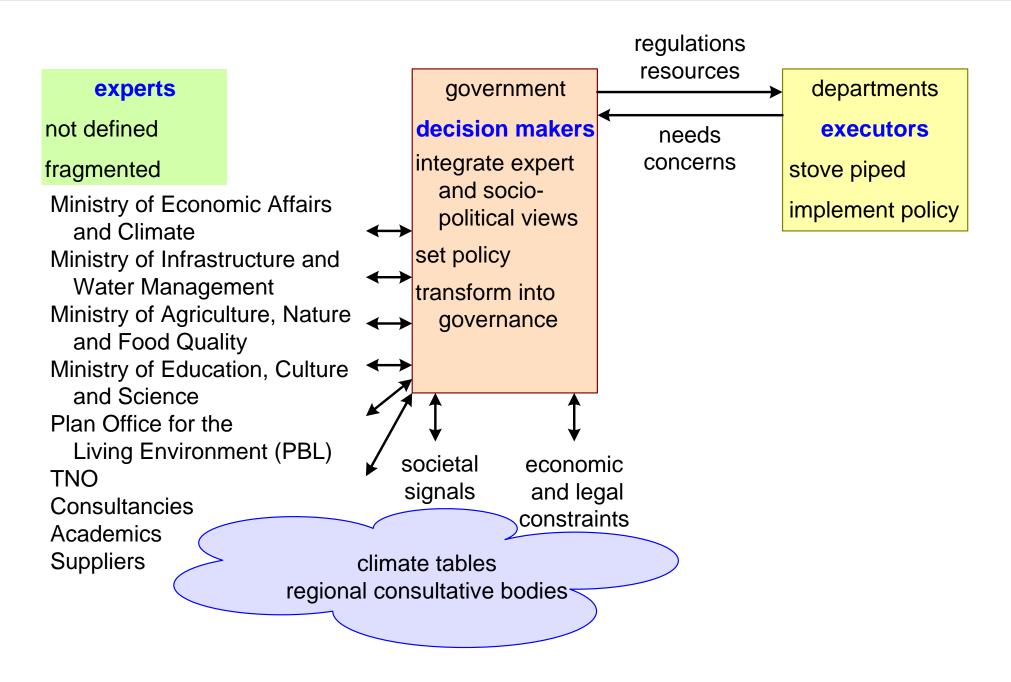


Summary Sustainability Roadmap Best



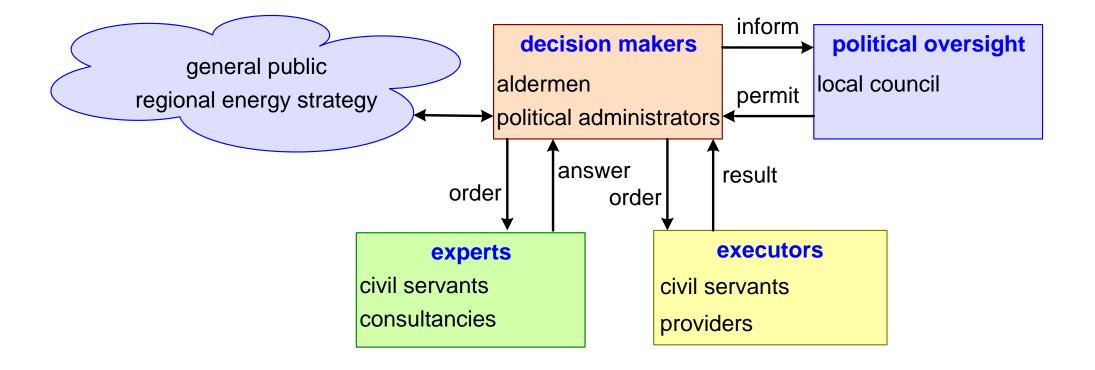


National Sustainability Organization(?)



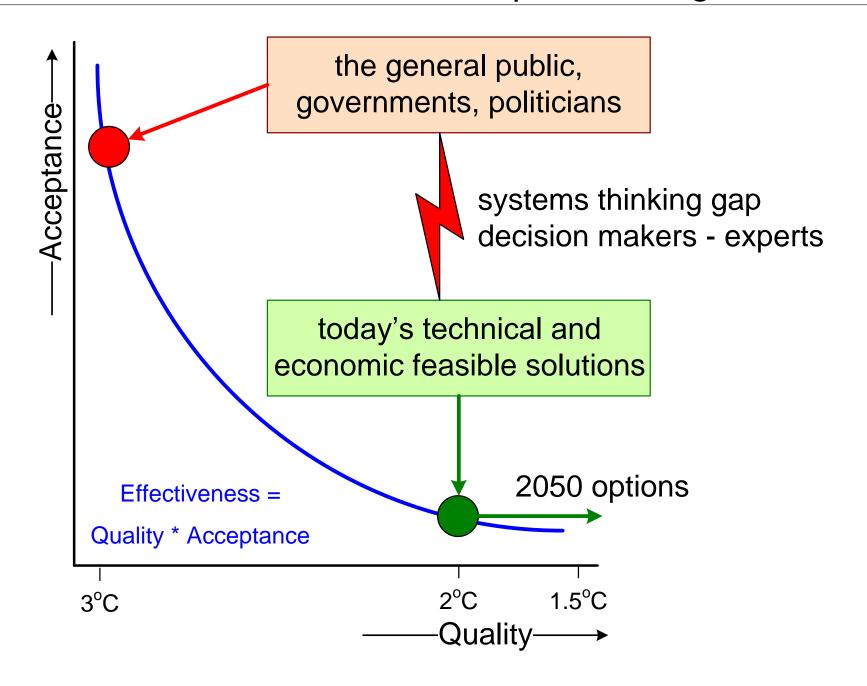


Local Sustainability Organization(?)





Solutions are Known, the Leadership is Missing



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STRSconclusion



From Past to Future

