

Role of Systems Architecting in Innovation

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Abstract

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August 16, 2025

status: preliminary

draft

version: 0

logo

TBD

The Embedded Systems Domain



chip



GSM



MRI scanner



cardio X-ray system



television

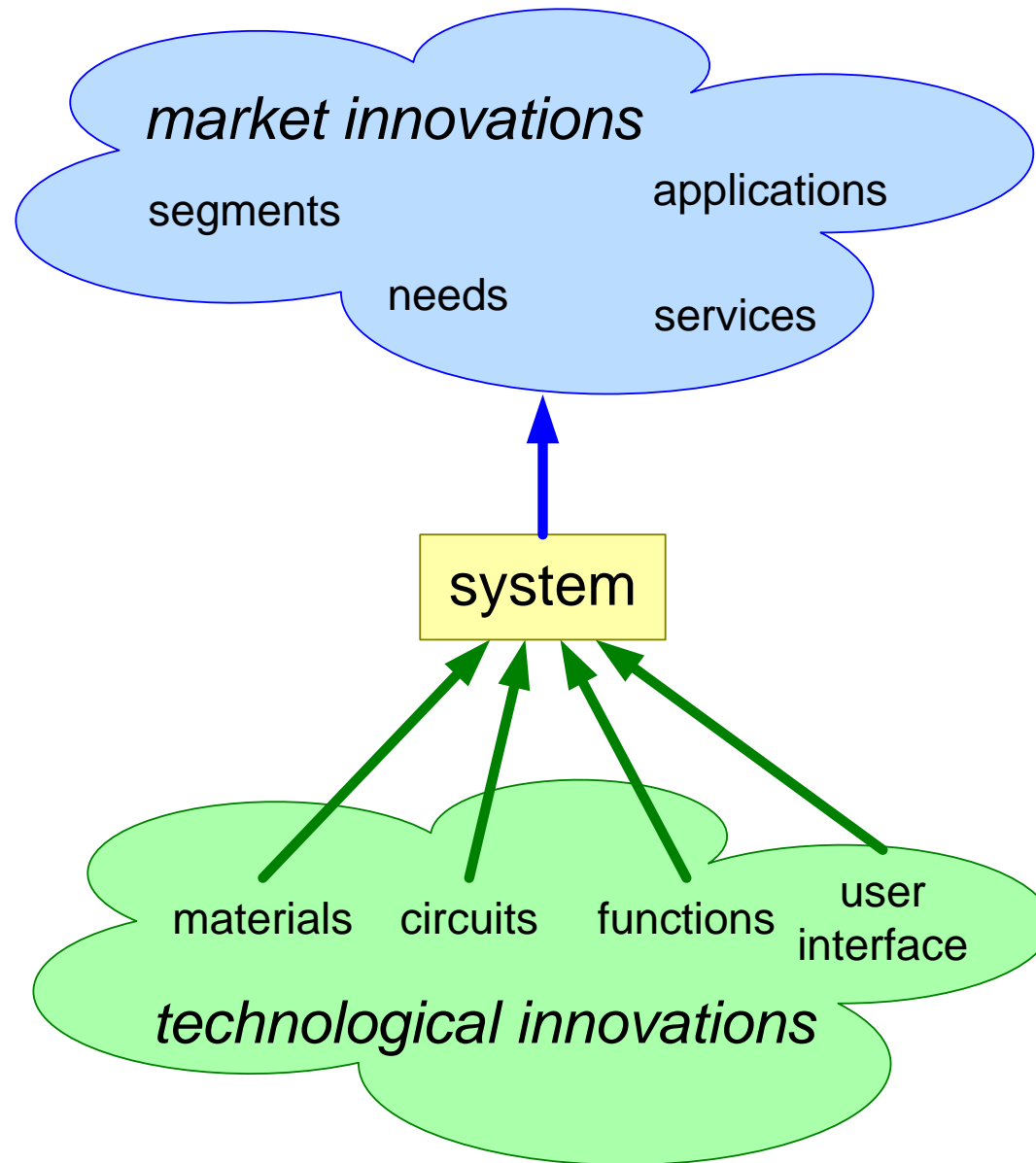


printer

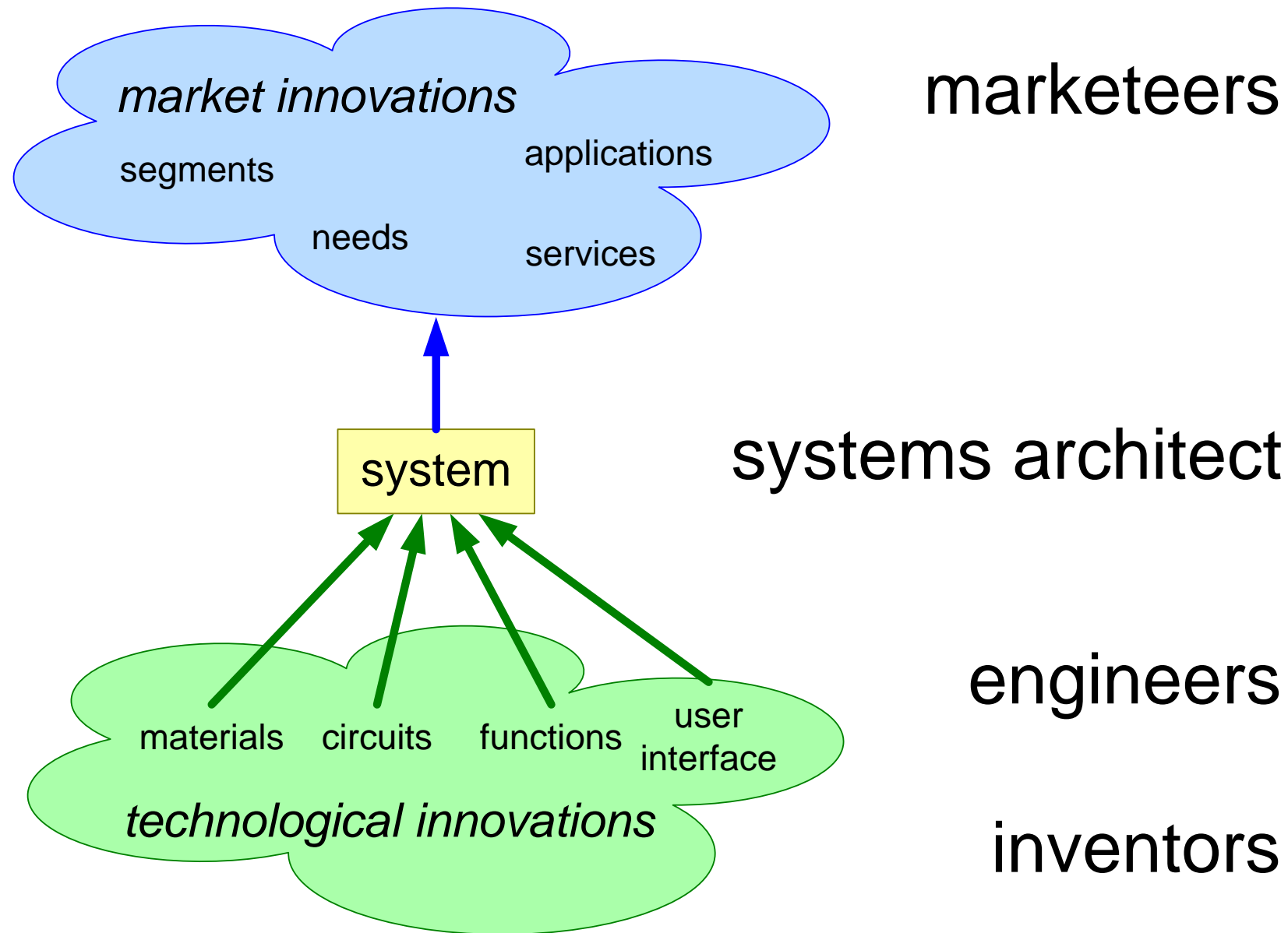


waferstepper

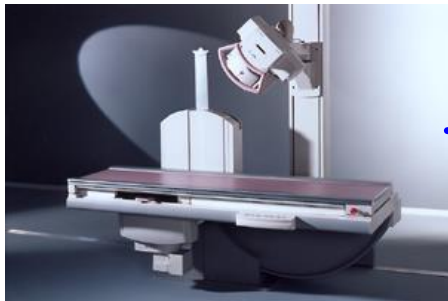
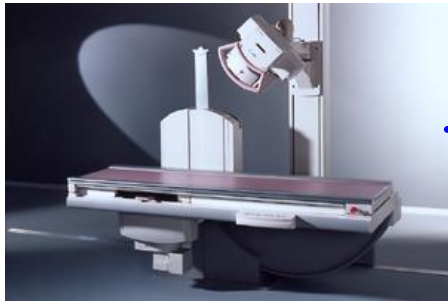
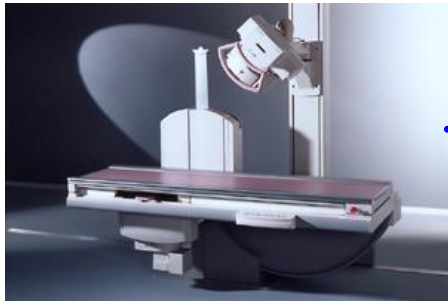
Successful Innovation = Technological + Market



System Architect links technology and market



Example: Easyvision serving three URF examination rooms



URF-systems

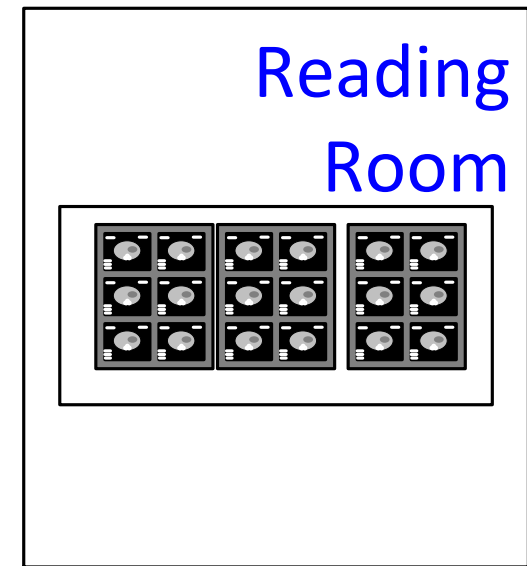
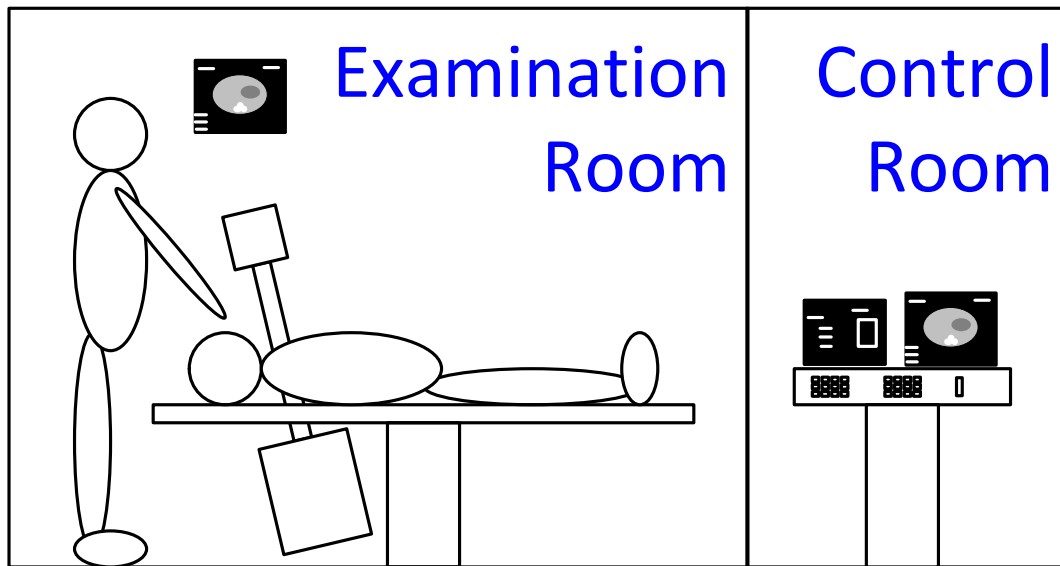
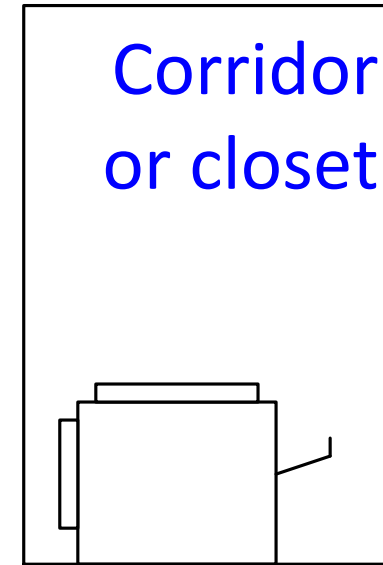
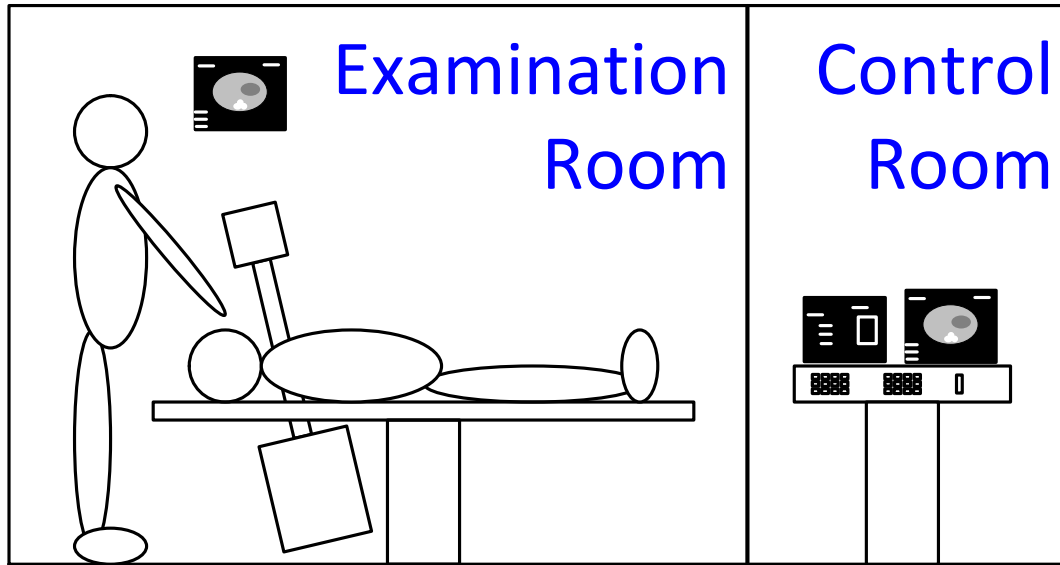


EasyVision: Medical Imaging Workstation

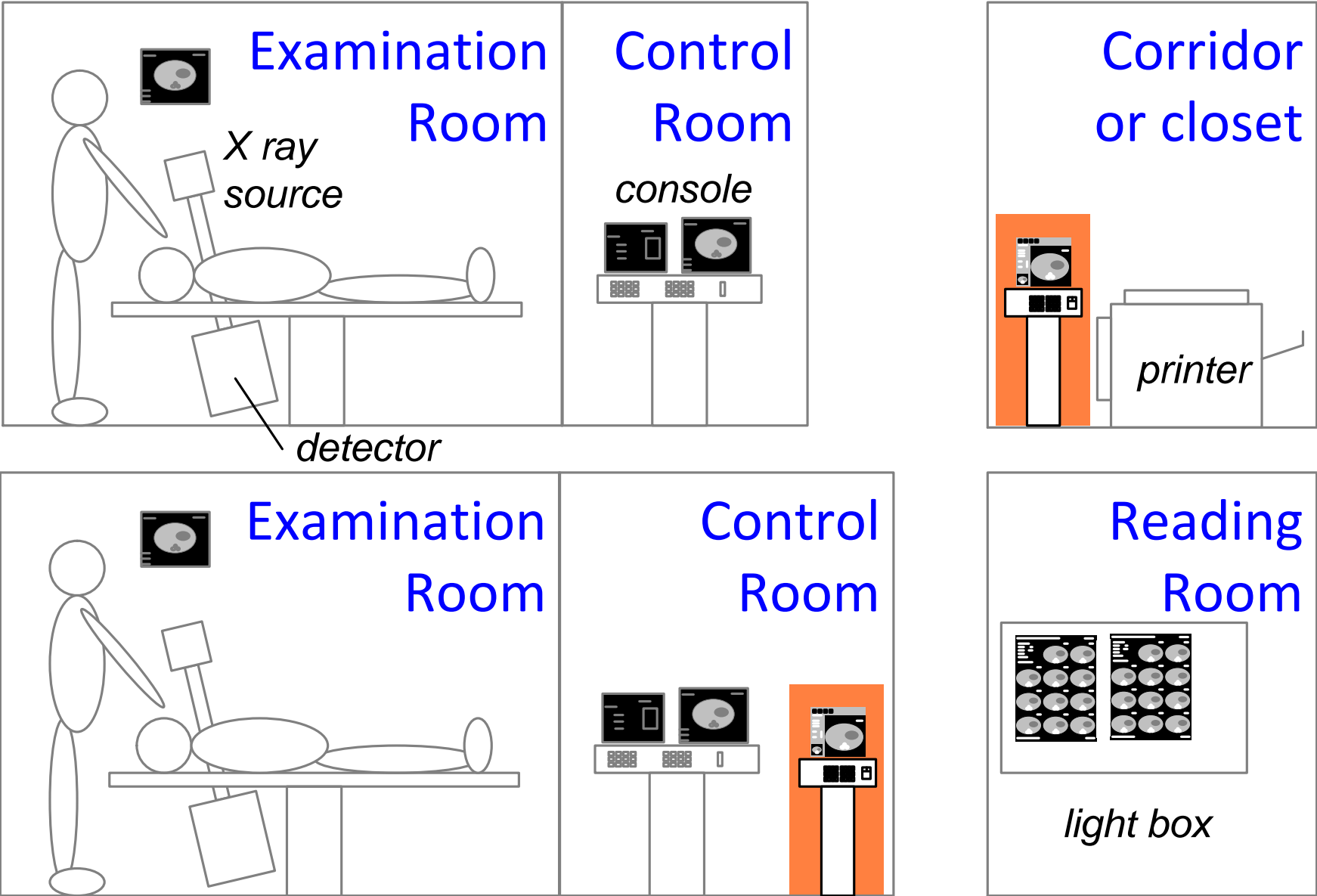


typical clinical image (intestines)

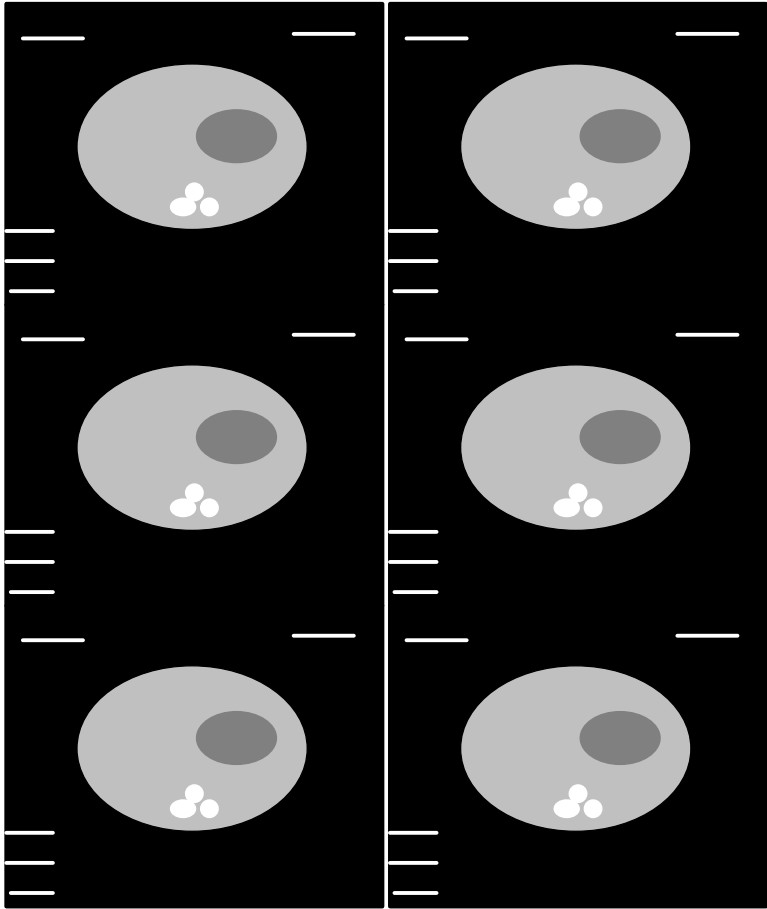
X-ray rooms from examination to reading around 1990



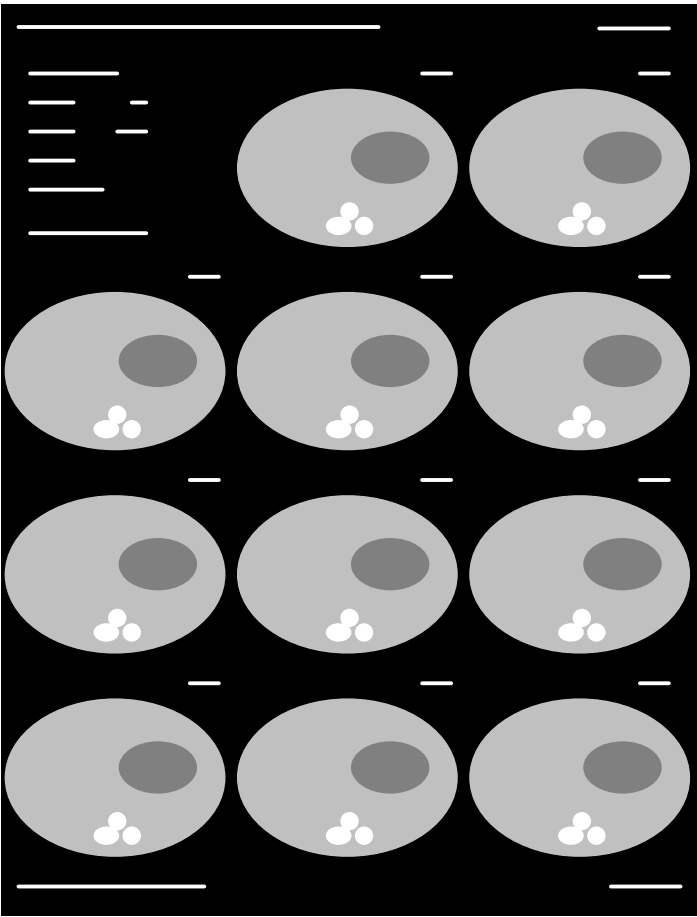
Product Innovation: Easyvision applied as printserver



Market innovation: optimized film



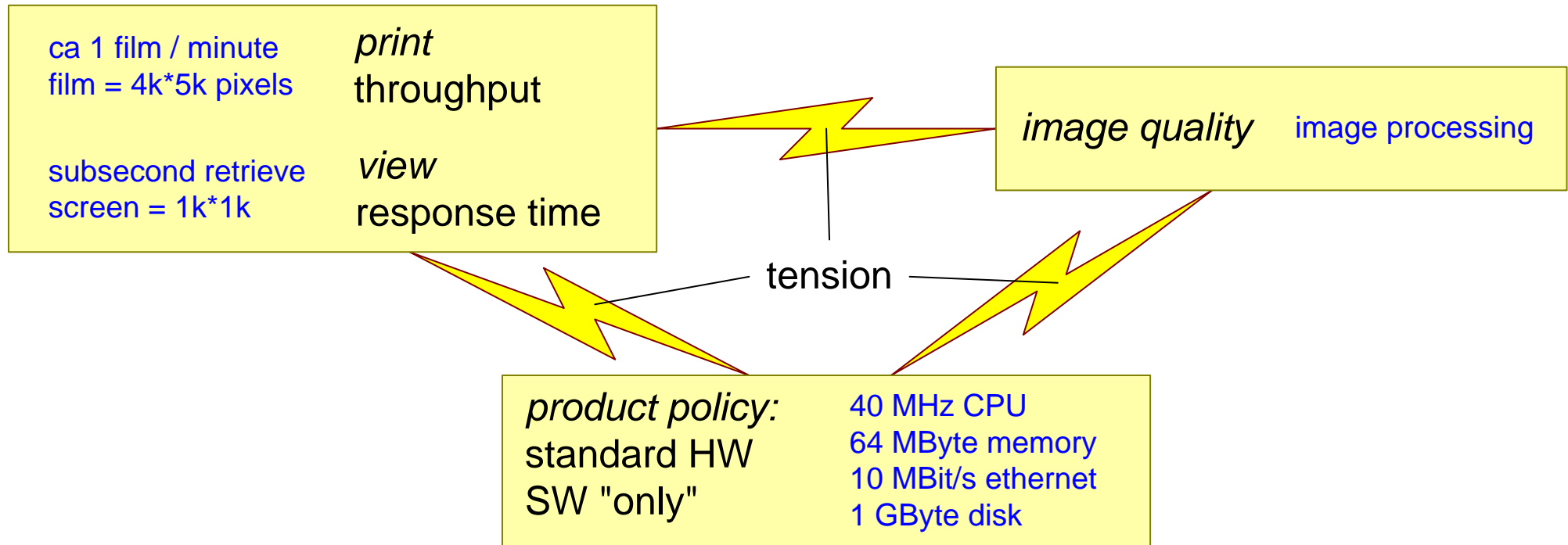
old: screen copy



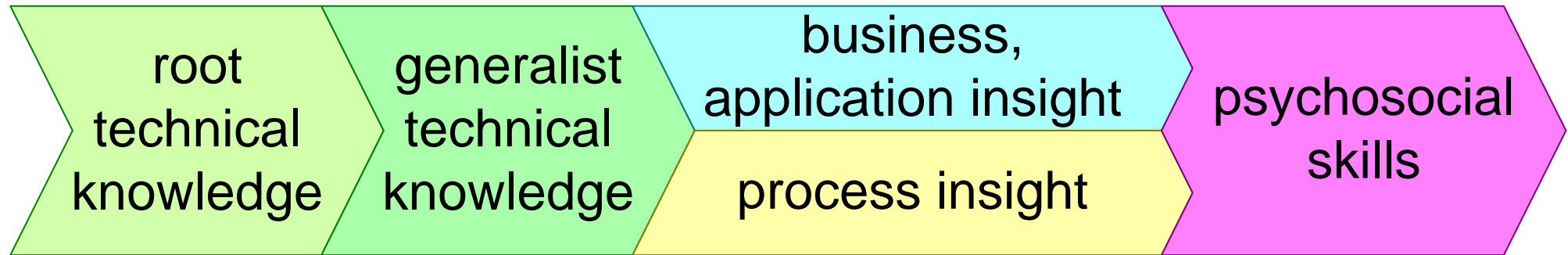
new: SW formatting

20 to 50% less film needed

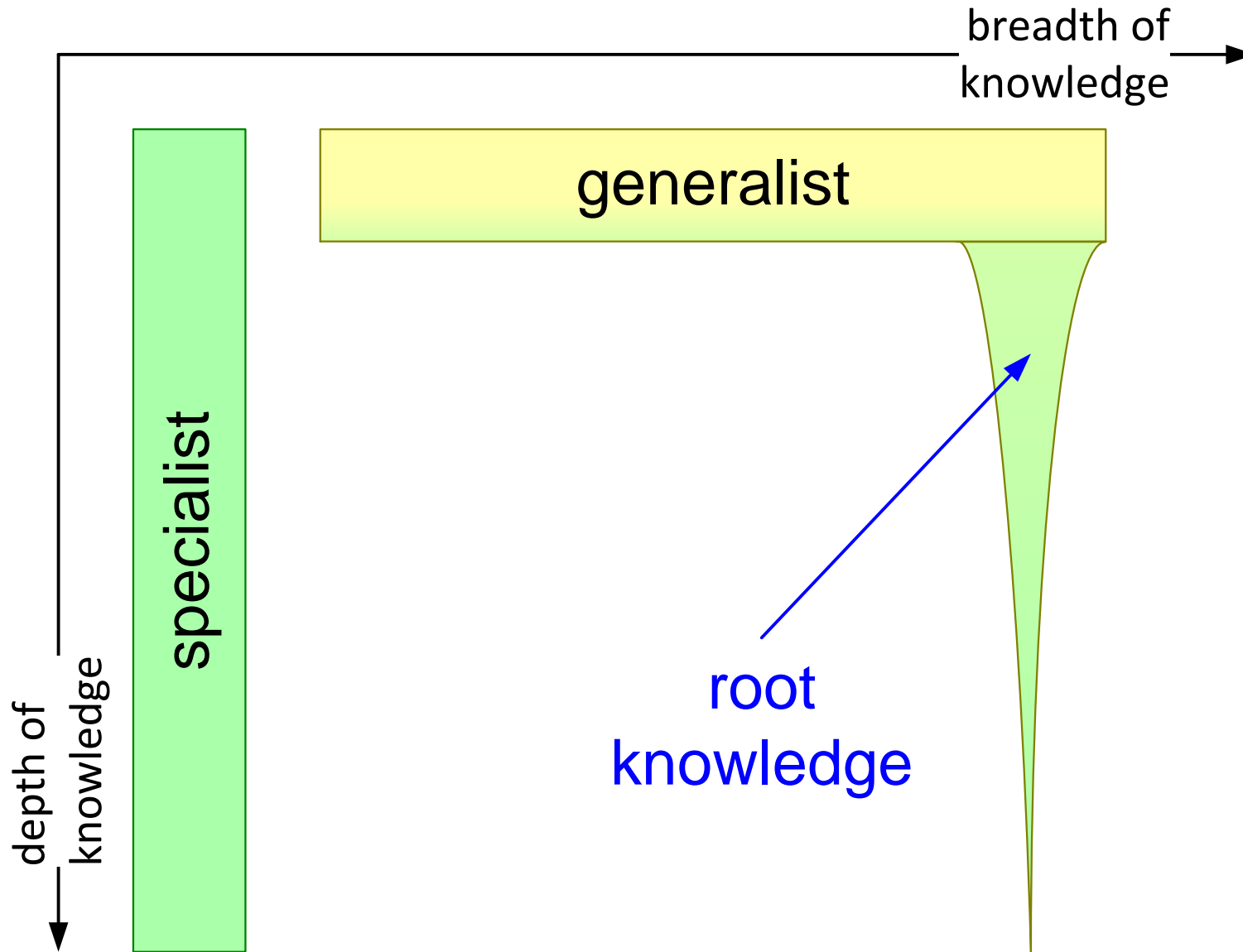
Technology innovation challenges



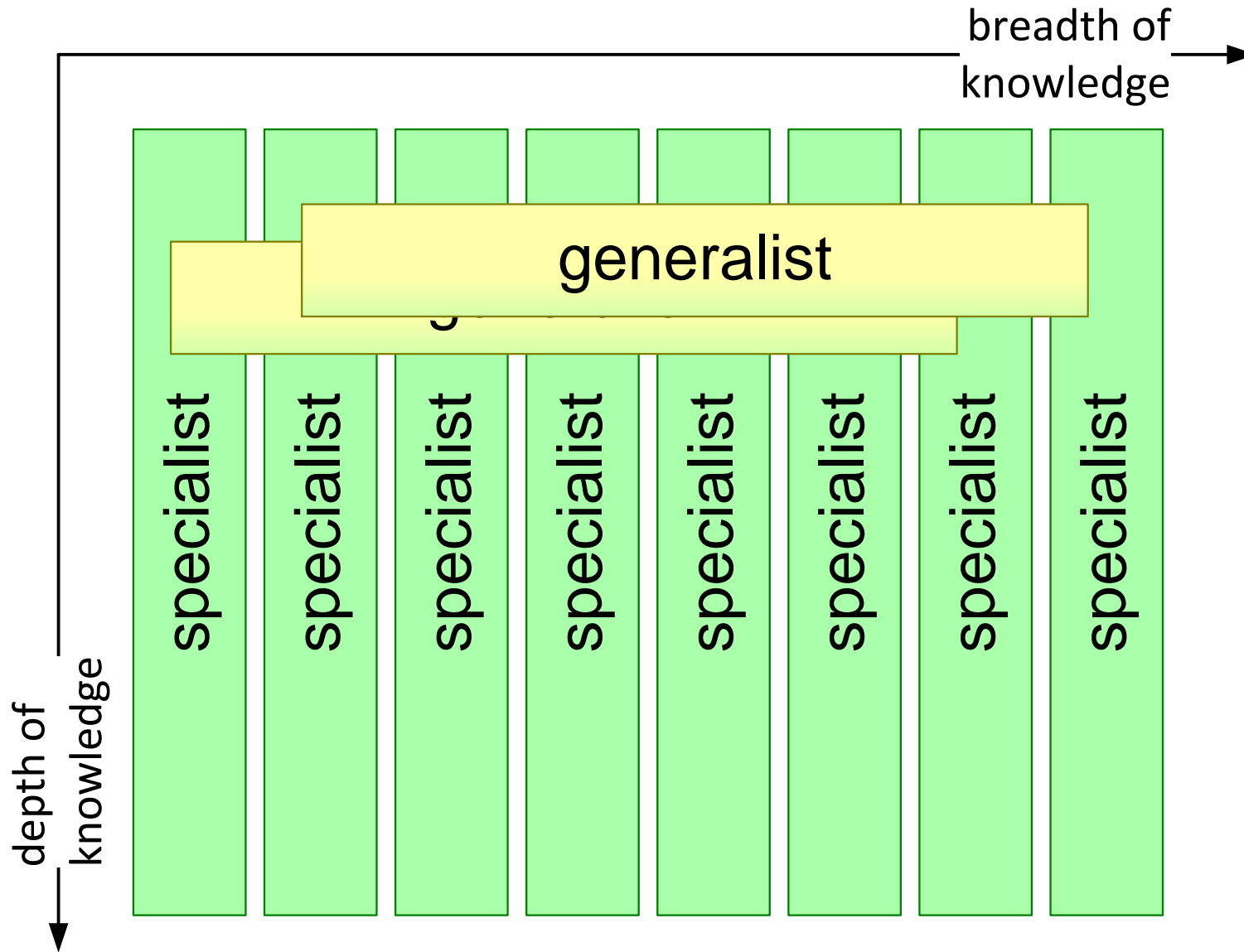
Typical Growth of a System Architect



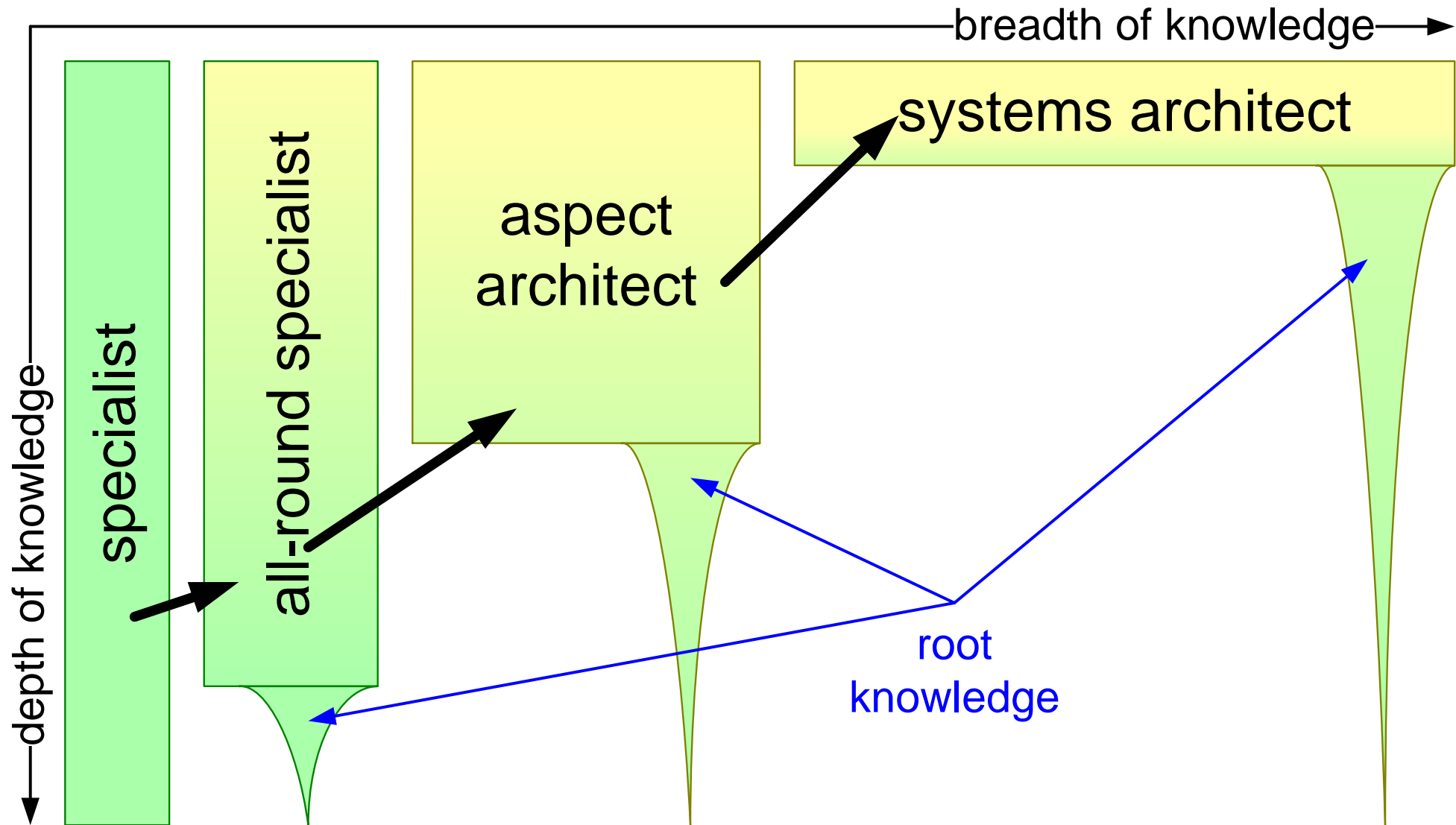
Generalist versus Specialist



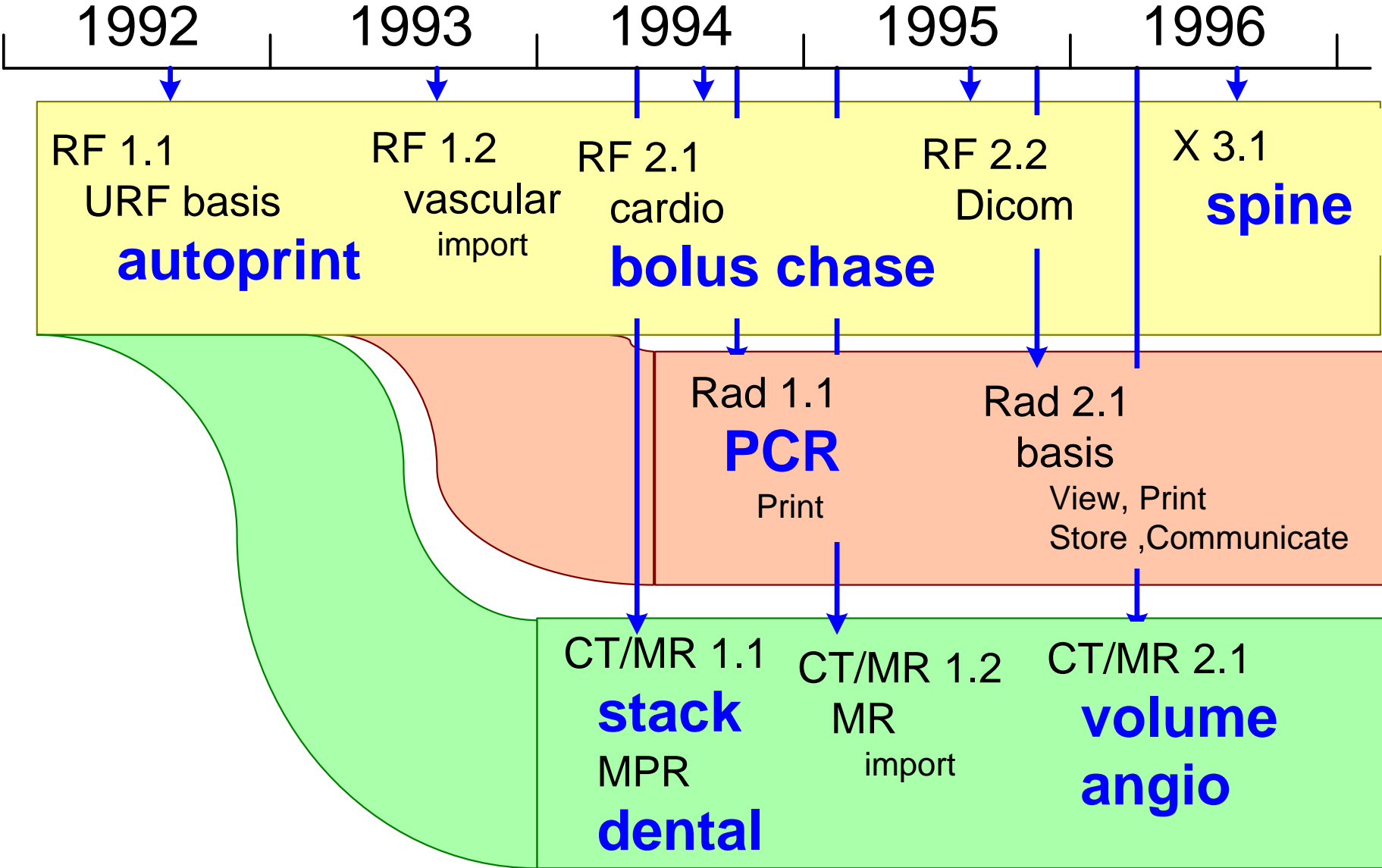
Generalists and Specialists are Complementary



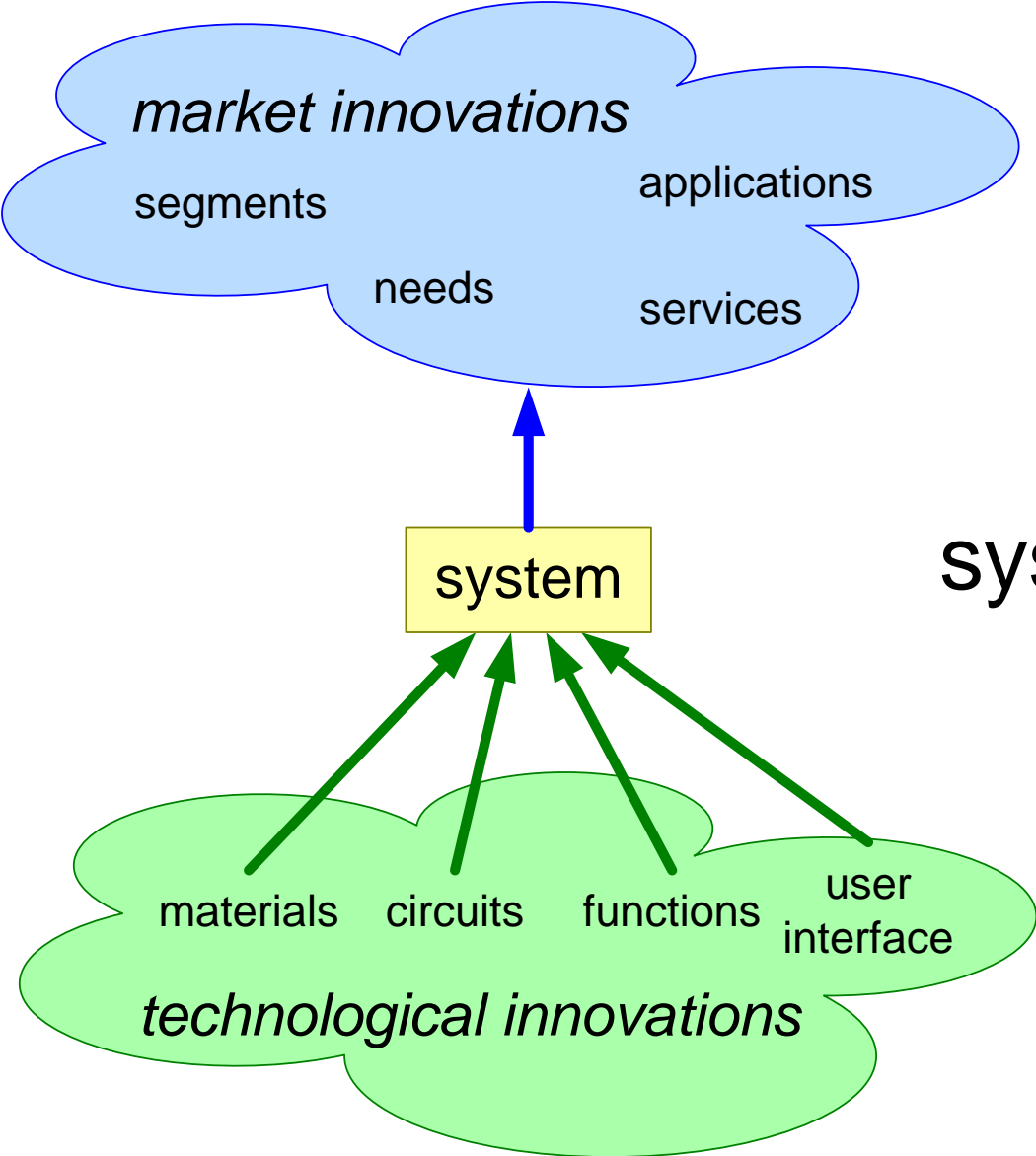
Spectrum from Specialist to System Architect



More innovations in Medical Imaging



Key success factor 1: innovation by all parties



marketeers



system architect



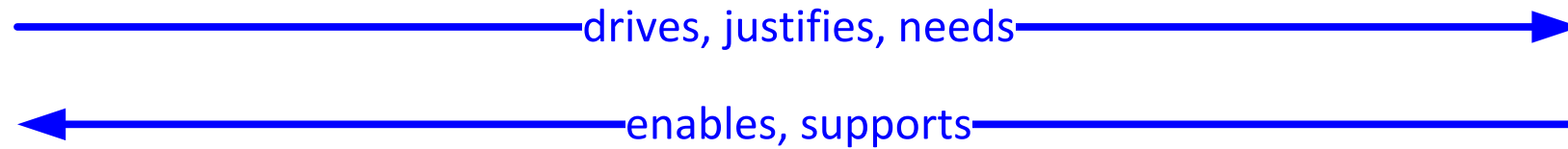
engineers



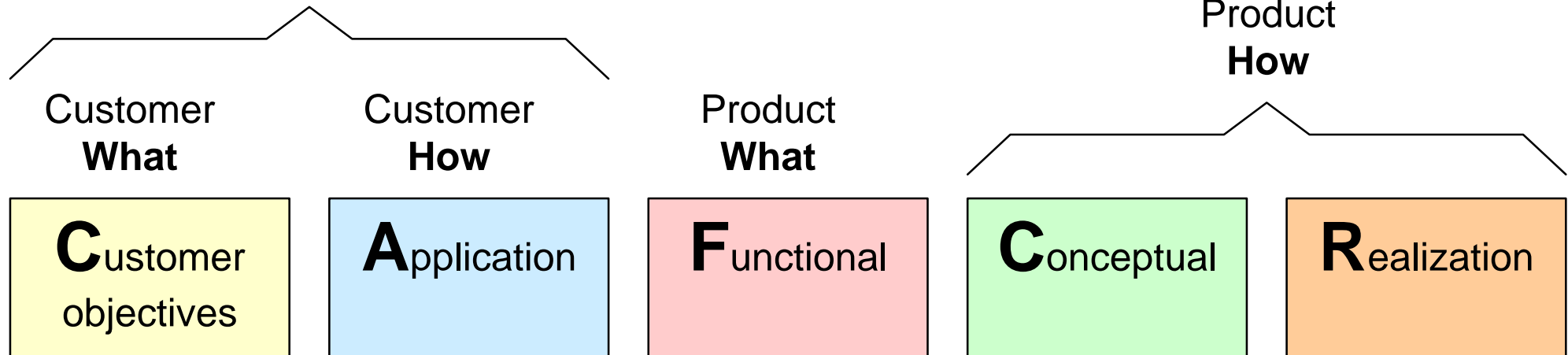
inventors



The "CAFCR" model

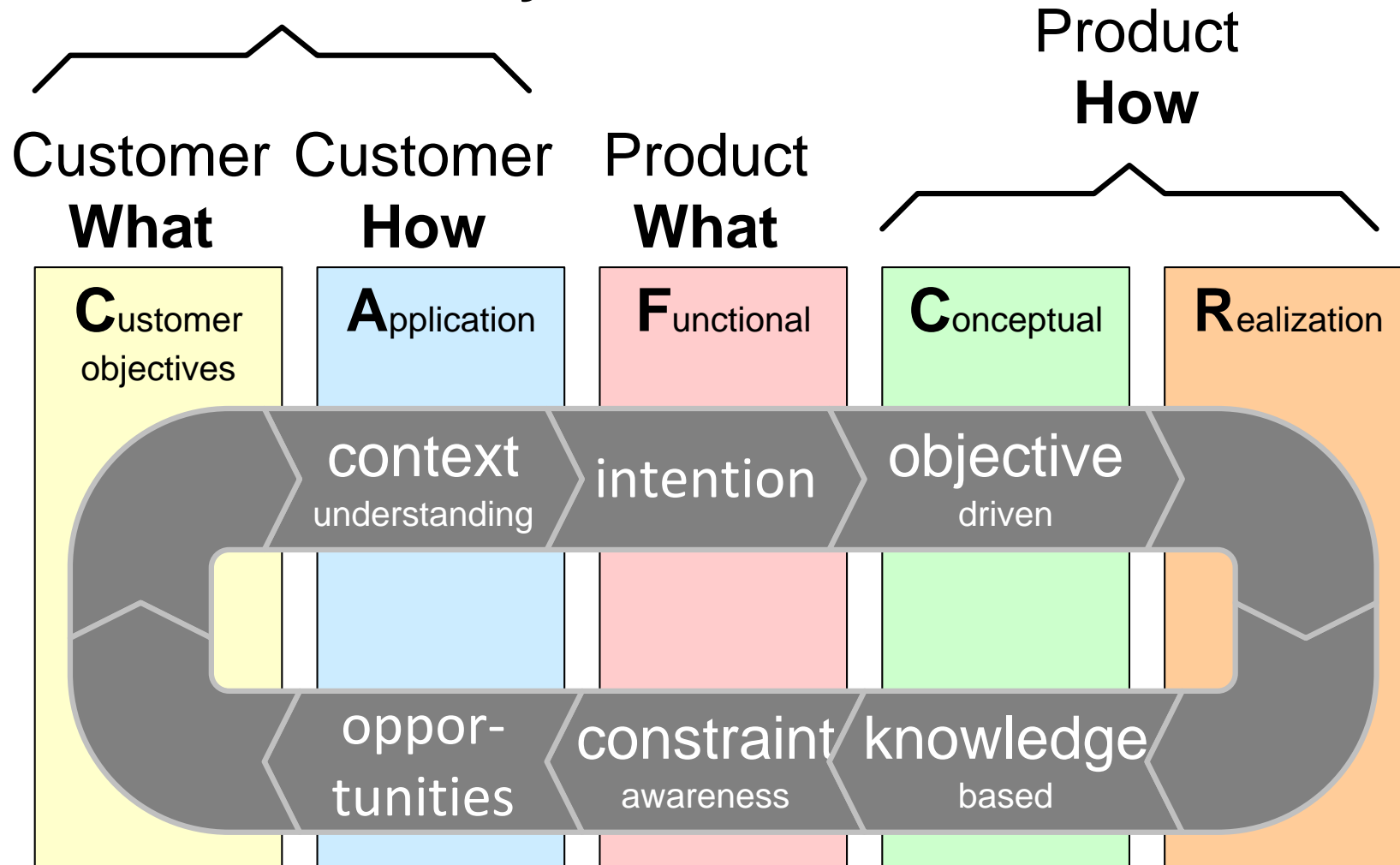


What does Customer need
in Product and **Why?**

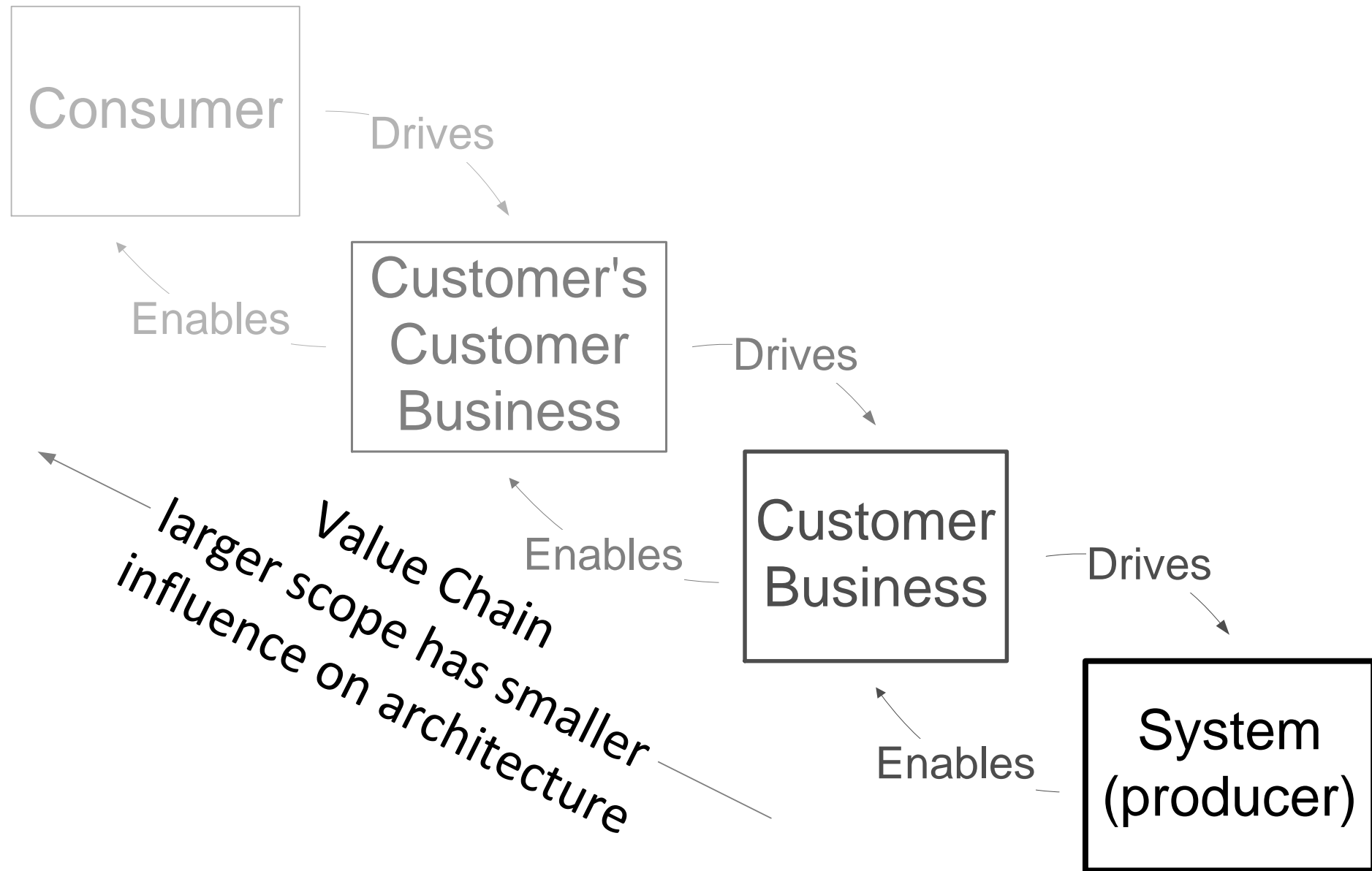


Integrating CAFCR

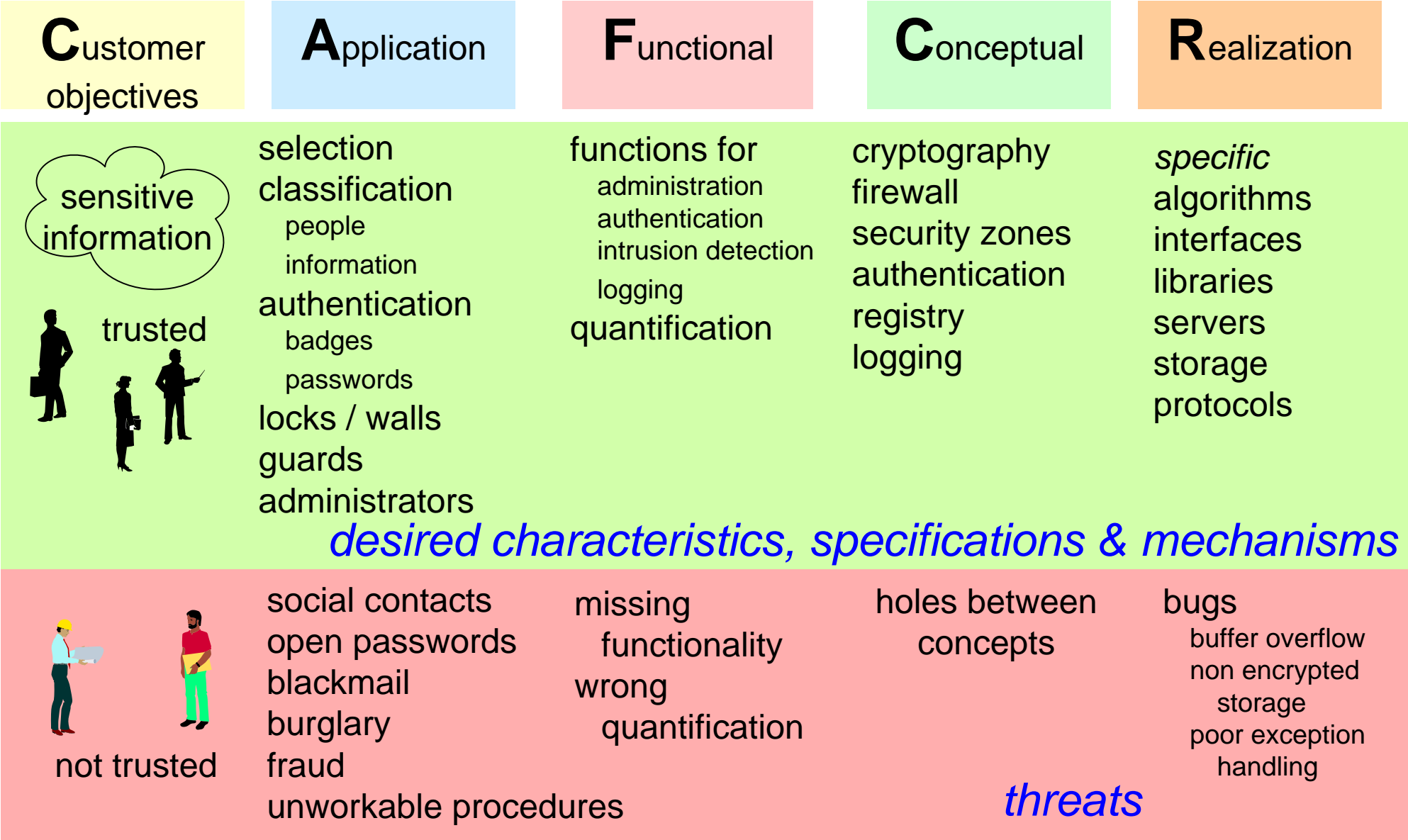
What does Customer need
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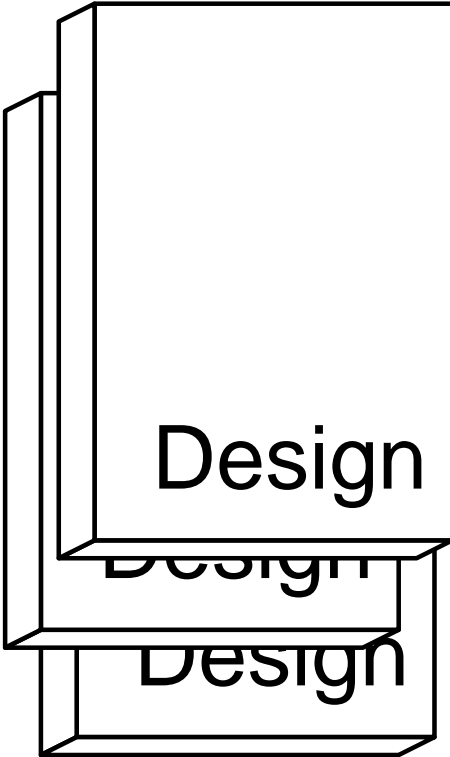
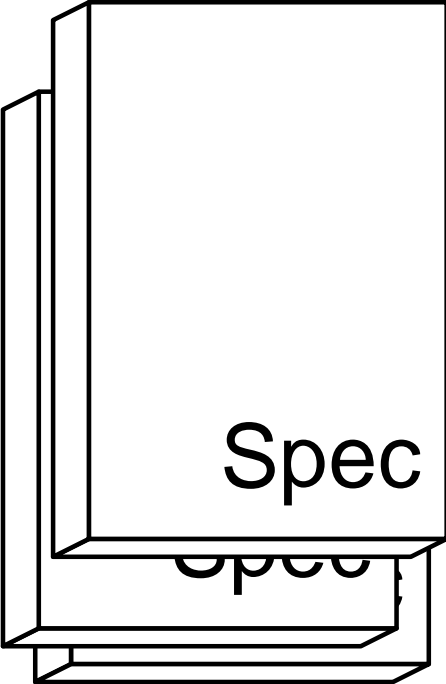
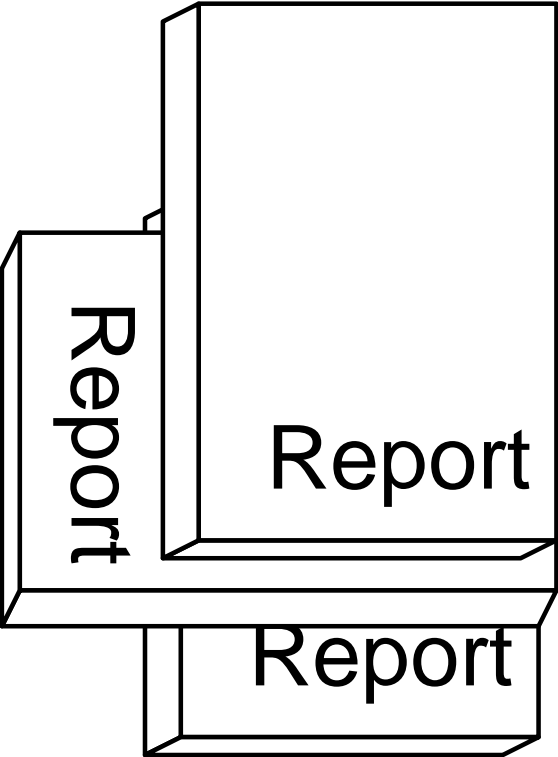
CAFCR can be applied recursively



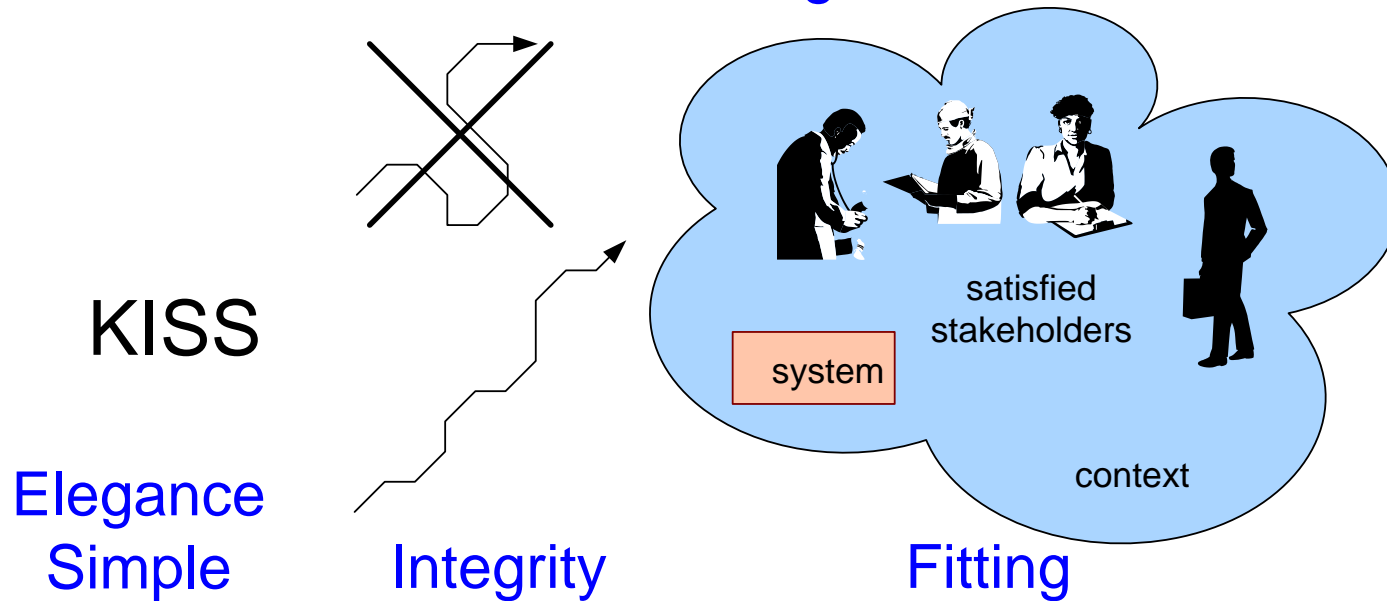
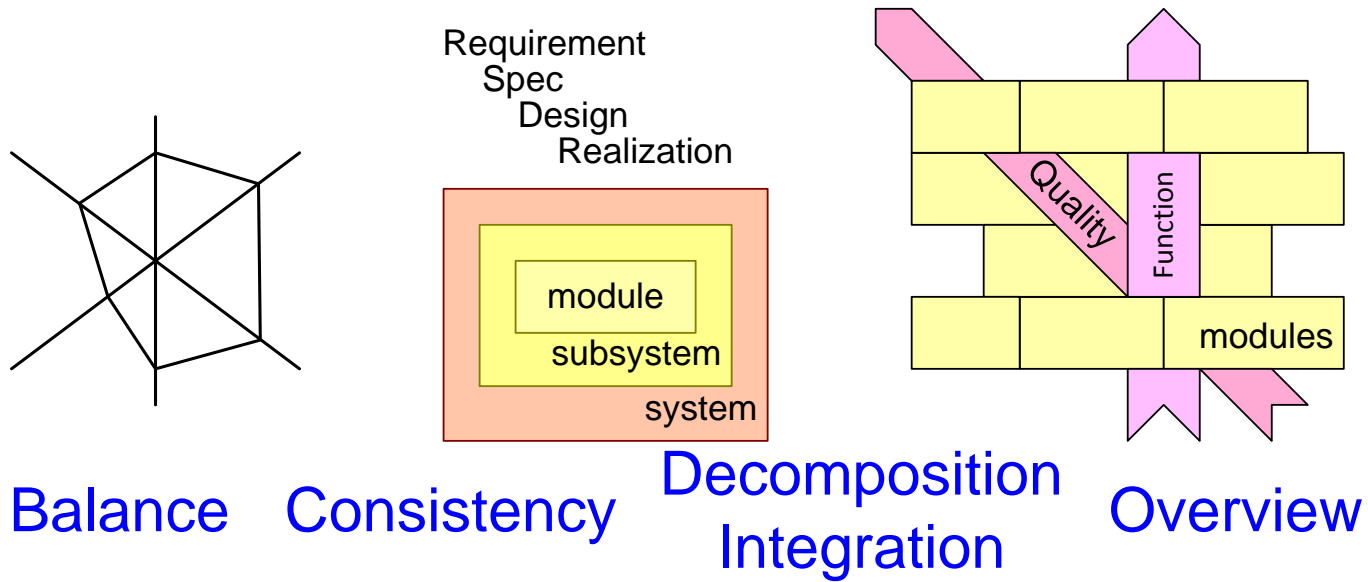
CAFCR applied on Security



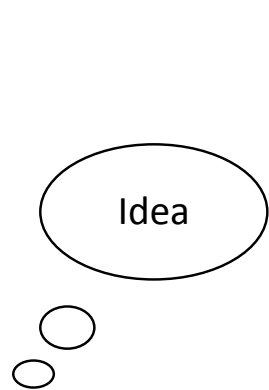
Deliverables of the System Architect



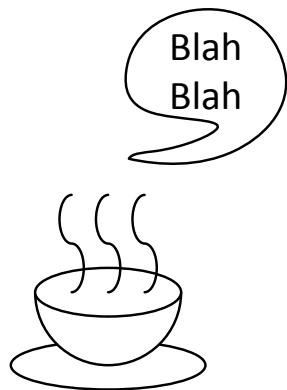
Responsibilities of the System Architect



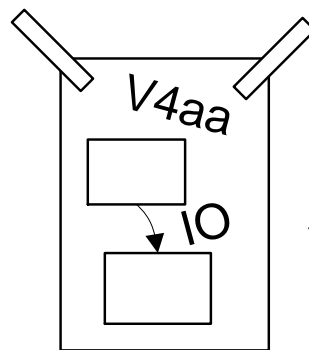
What does the System Architect do?



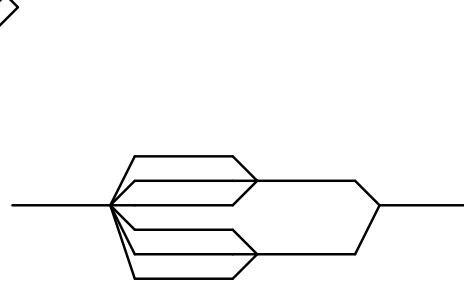
think,
analyze



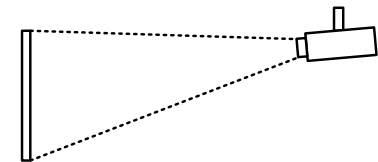
listen, talk,
walk around



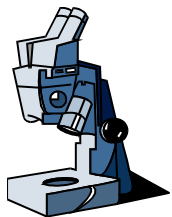
design,
brainstorm,
explain



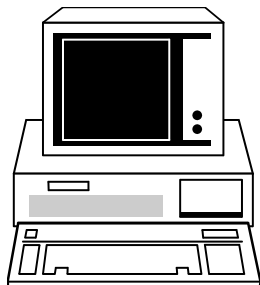
assist project leader
with work breakdown,
schedule, risks



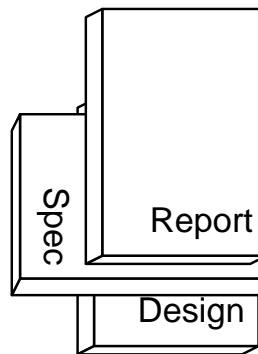
present,
meet, teach,
discuss



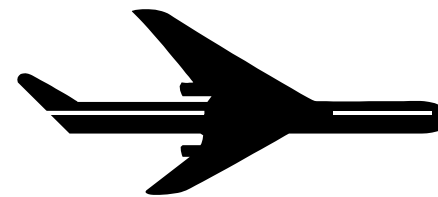
test,
integrate



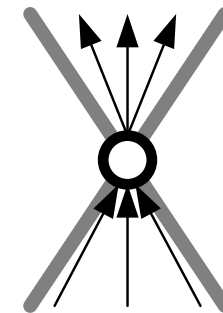
write,
consolidate,
browse



read,
review



travel to
customer,
supplier,
conference

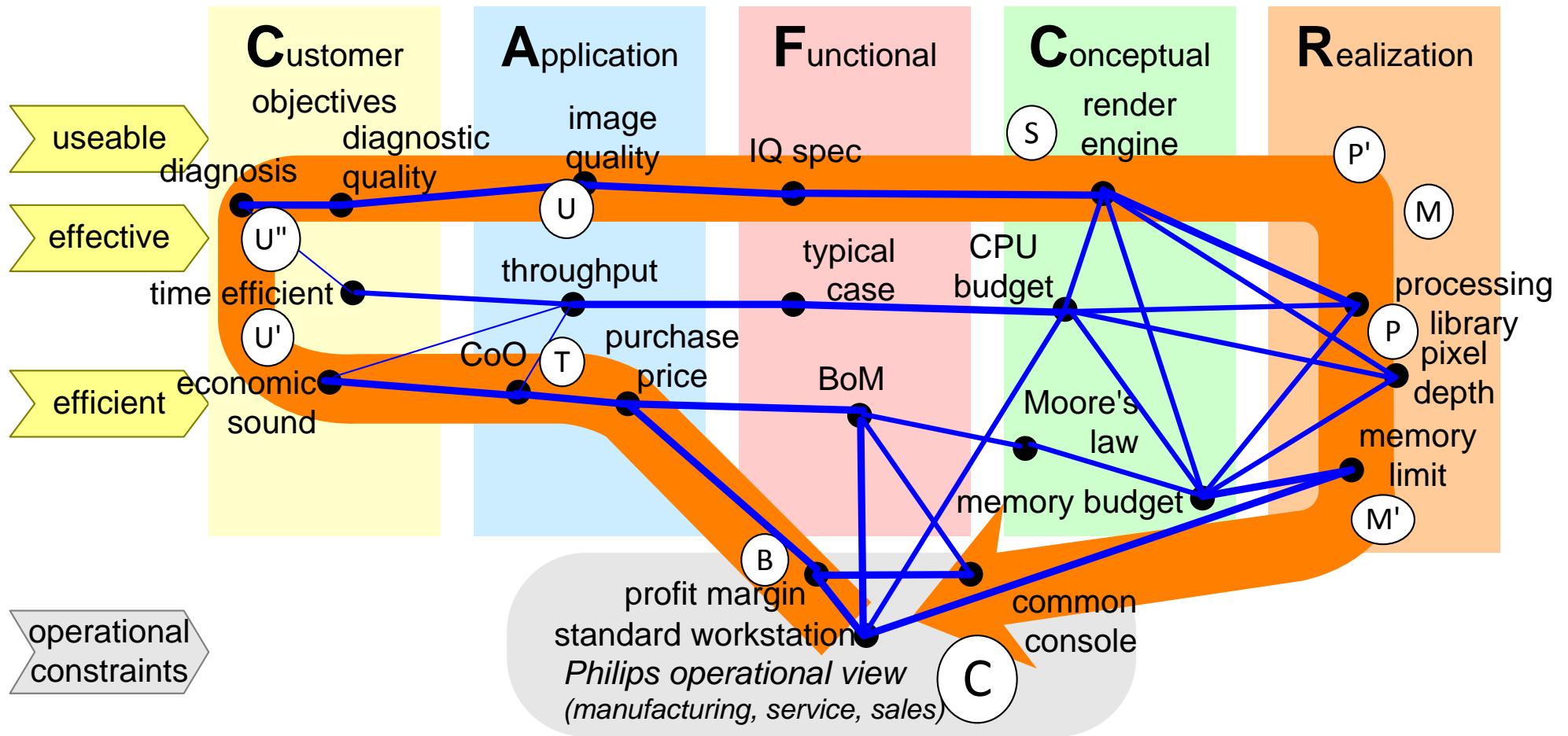


provide
vision and
leadership

From Detail to Overview

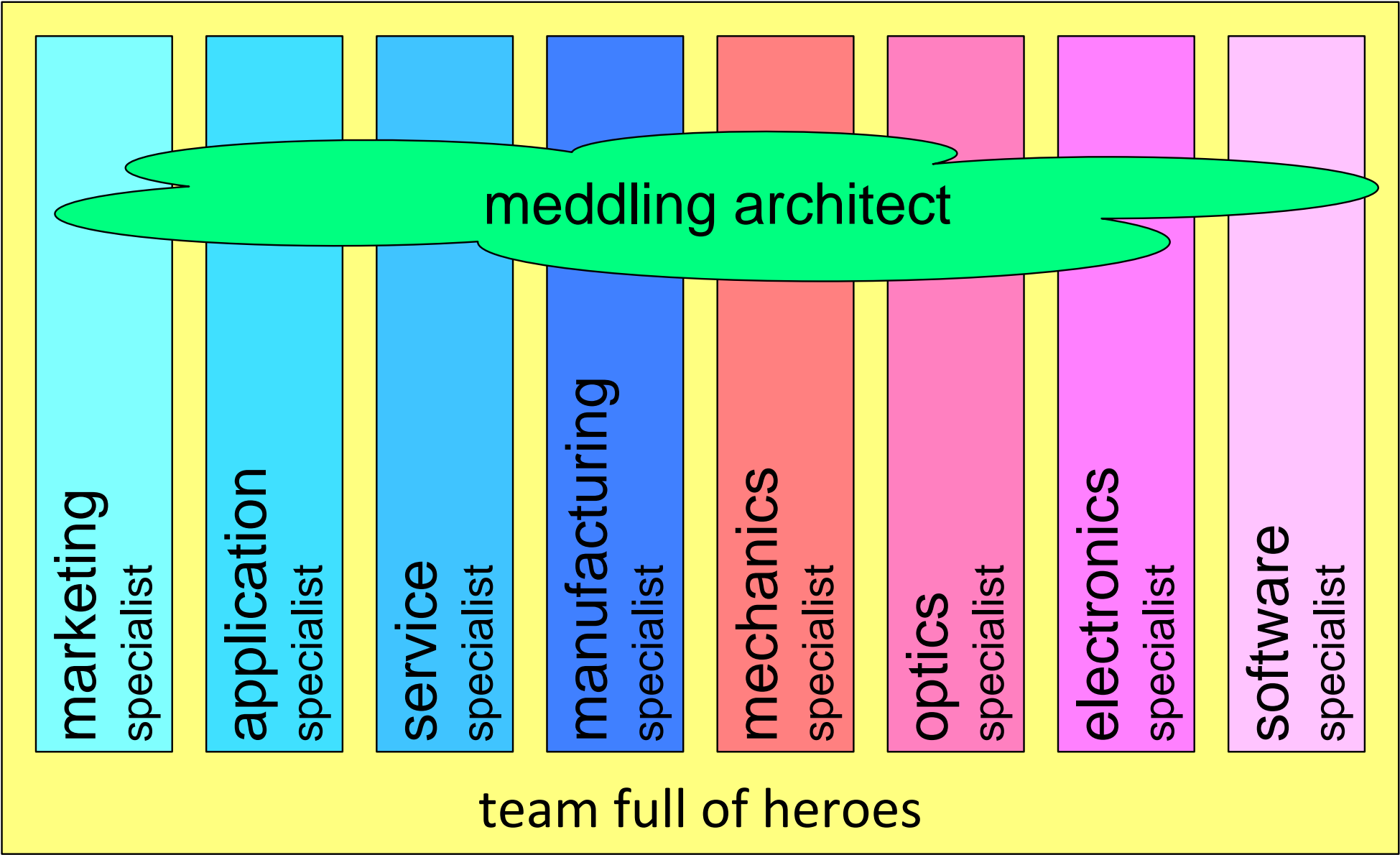
		Quantity per year (order-of- magnitude)	architect time per item
consolidation in deliverables meetings informal contacts sampling scanning	→ driving views	10	100 h
	→ shared issues	10^2	1 h
	→ touched details	10^4	0.5 – 10 min
	→ seen details	$10^5 - 10^6$	0.1 – 1 sec
	→ product details	$10^7 - 10^{10}$	
	real-world facts	infinite	

Key Success Factor 2: highly iterative



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

Key Success Factor 3: Architect as Integrator



Innovation Challenges in Embedded Systems

