

Role of Systems Architecting in Innovation

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Abstract

Distribution

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July 1, 2011

status: preliminary

draft

version: 0

logo
TBD

The Embedded Systems Domain



chip



GSM



MRI scanner



cardio X-ray system



television

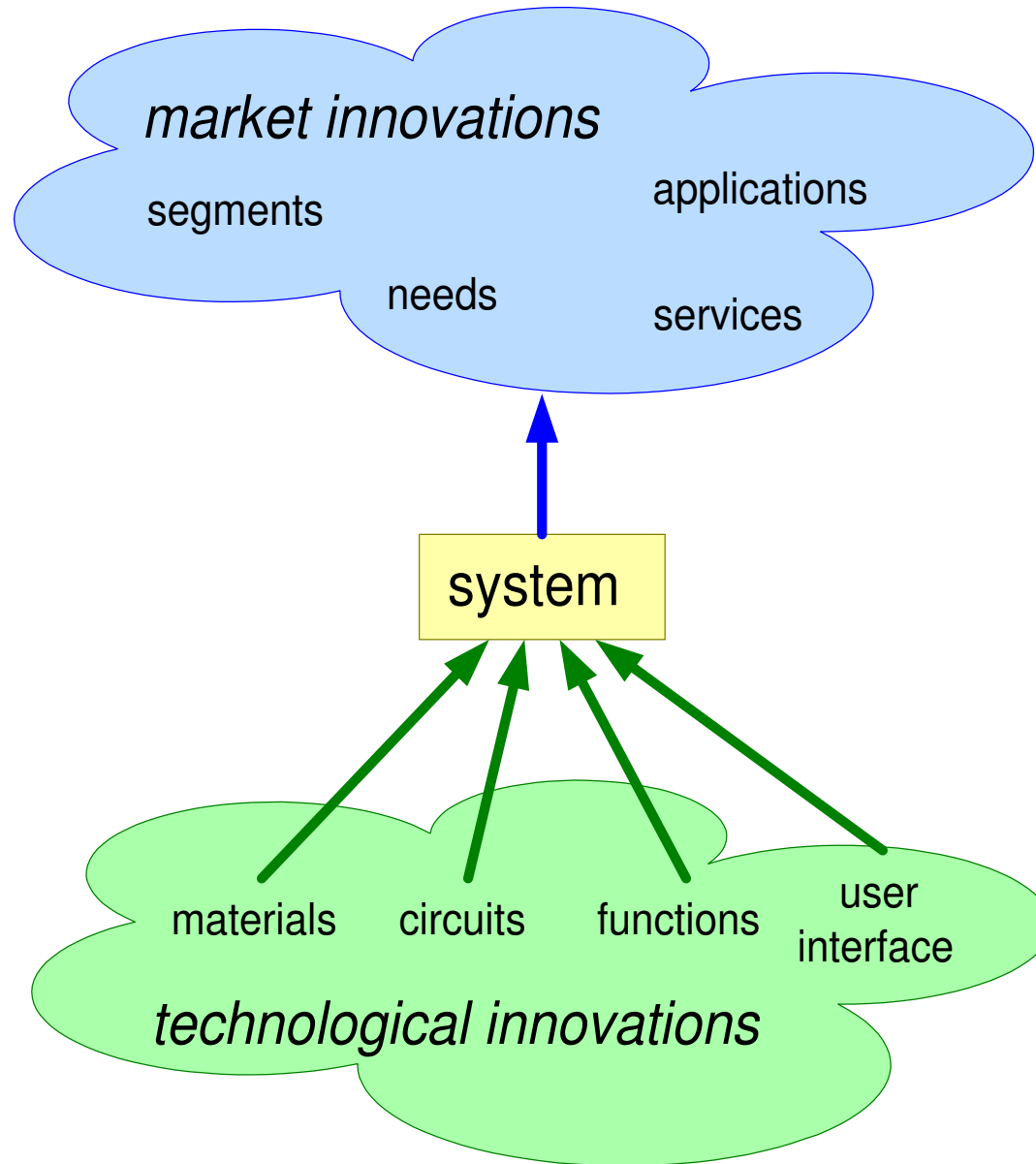


printer

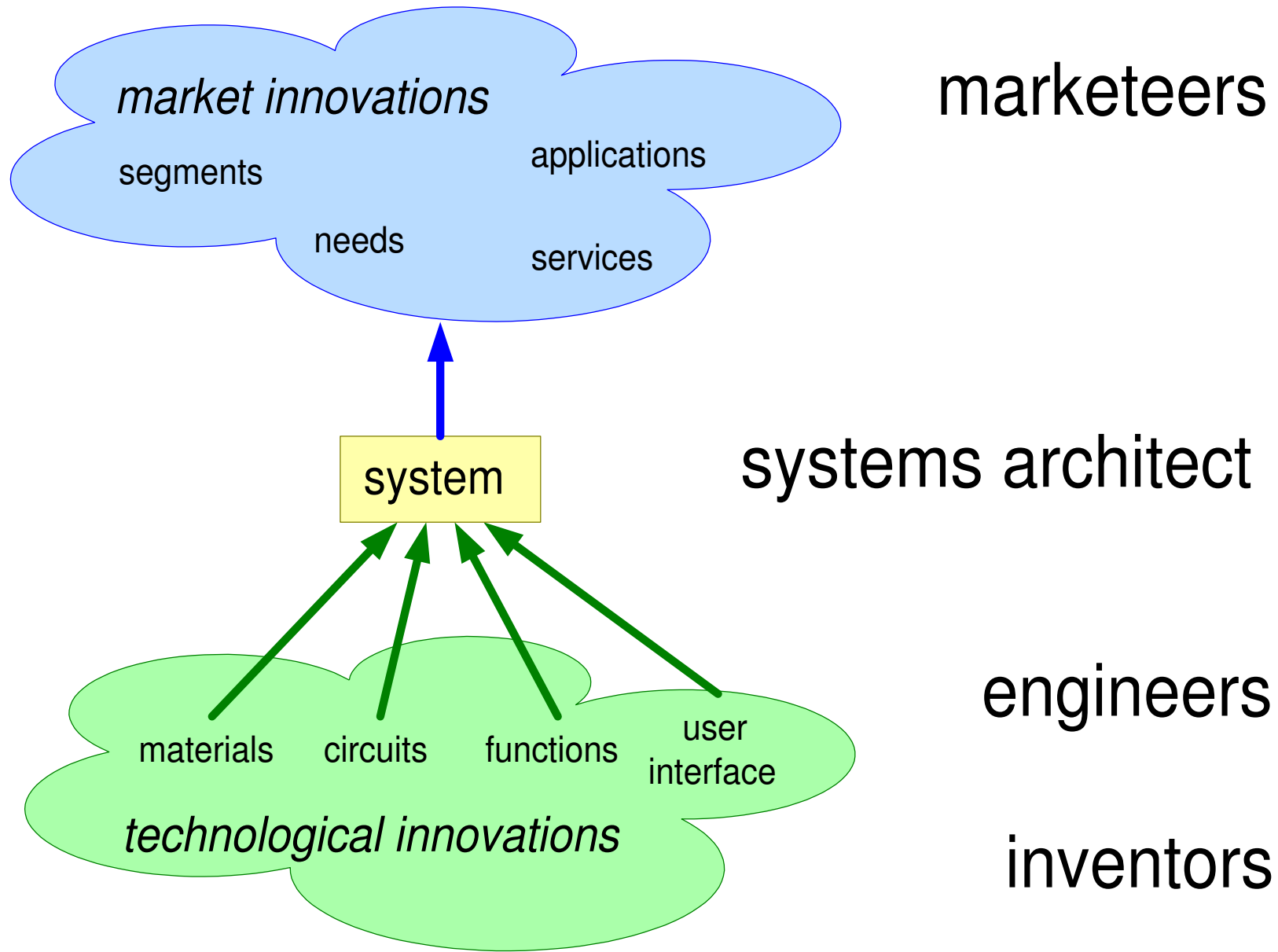


waferstepper

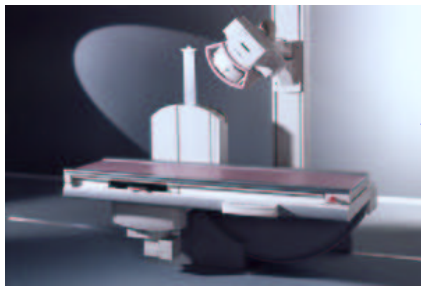
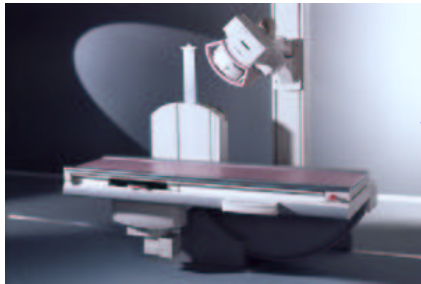
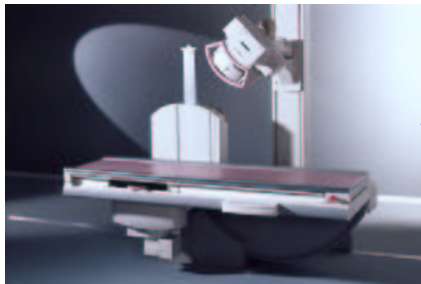
Successful Innovation = Technological + Market



System Architect links technology and market



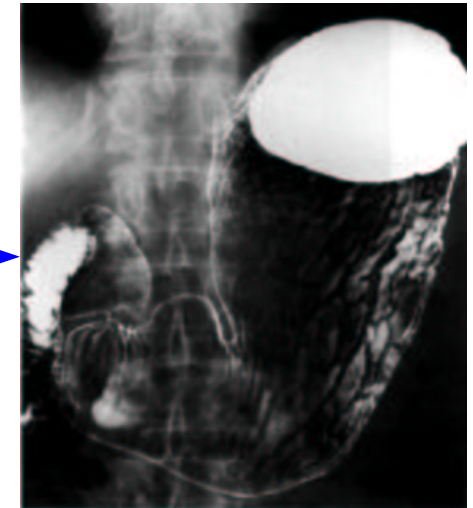
Example: Easyvision serving three URF examination rooms



URF-systems

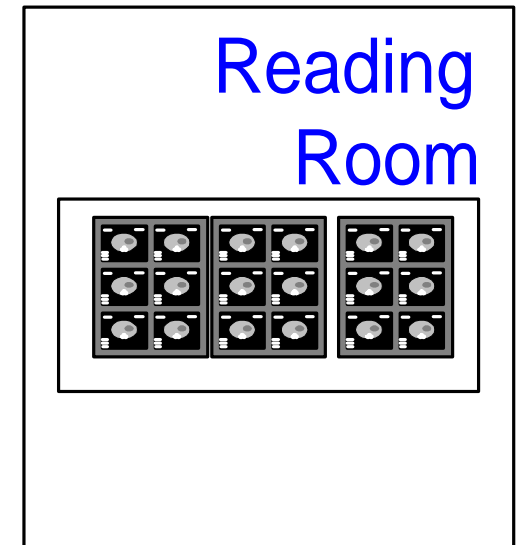
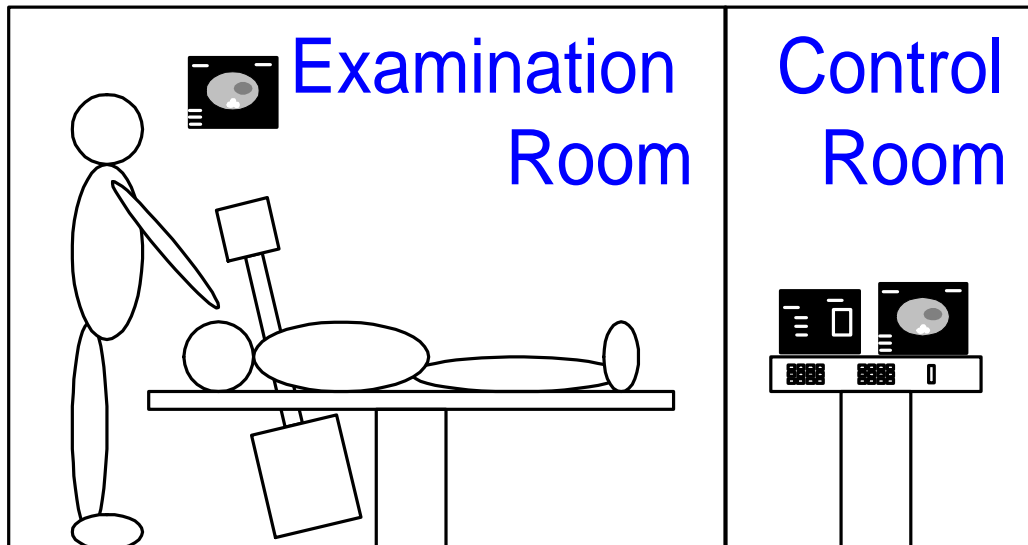
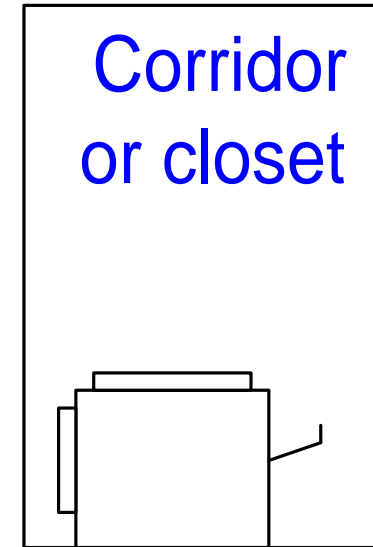
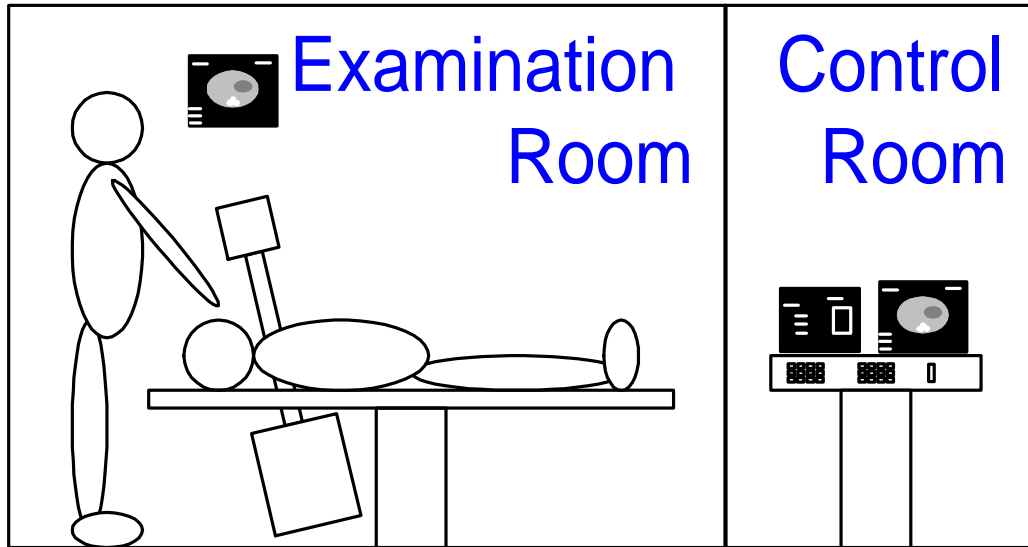


EasyVision: Medical Imaging Workstation

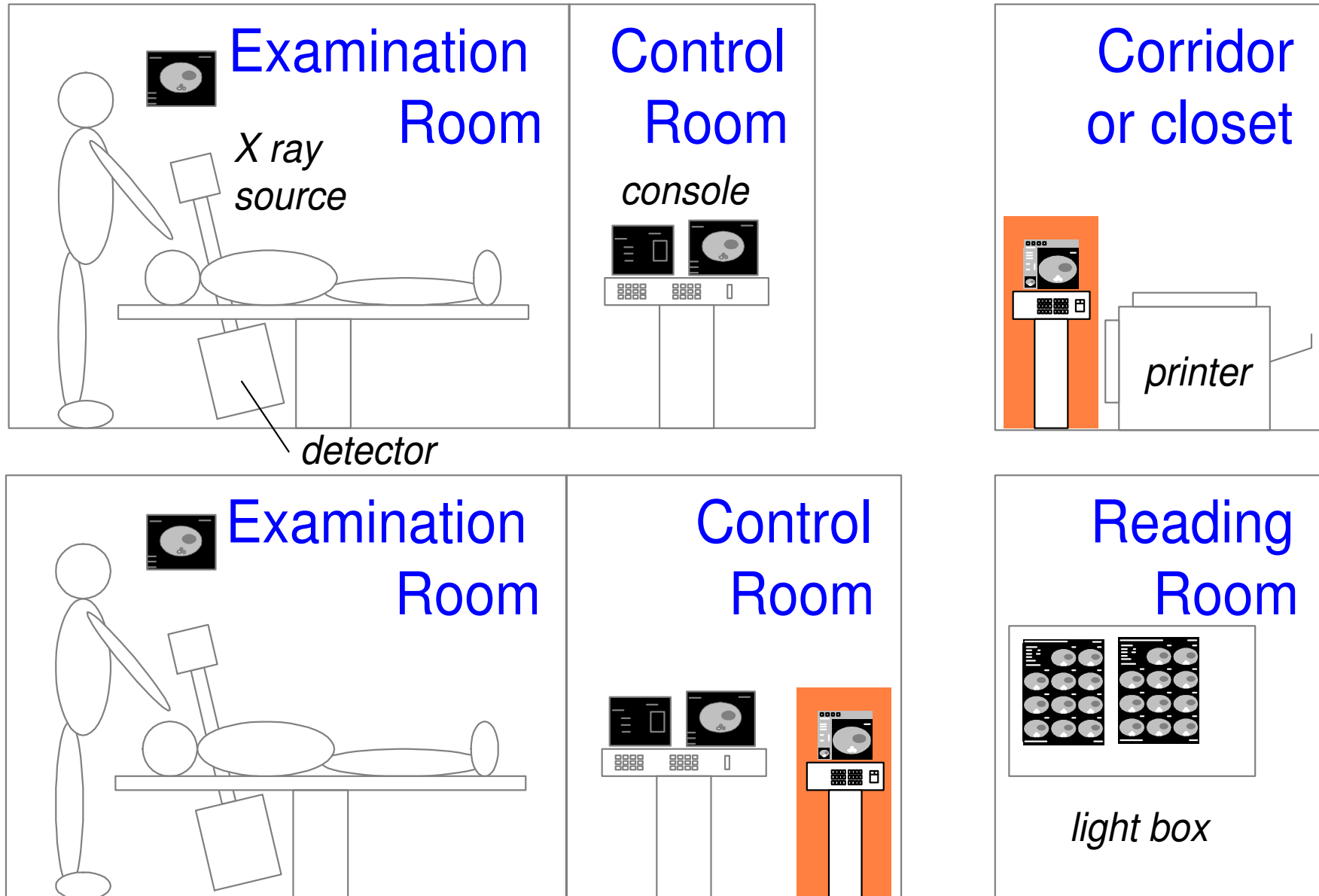


typical clinical image (intestines)

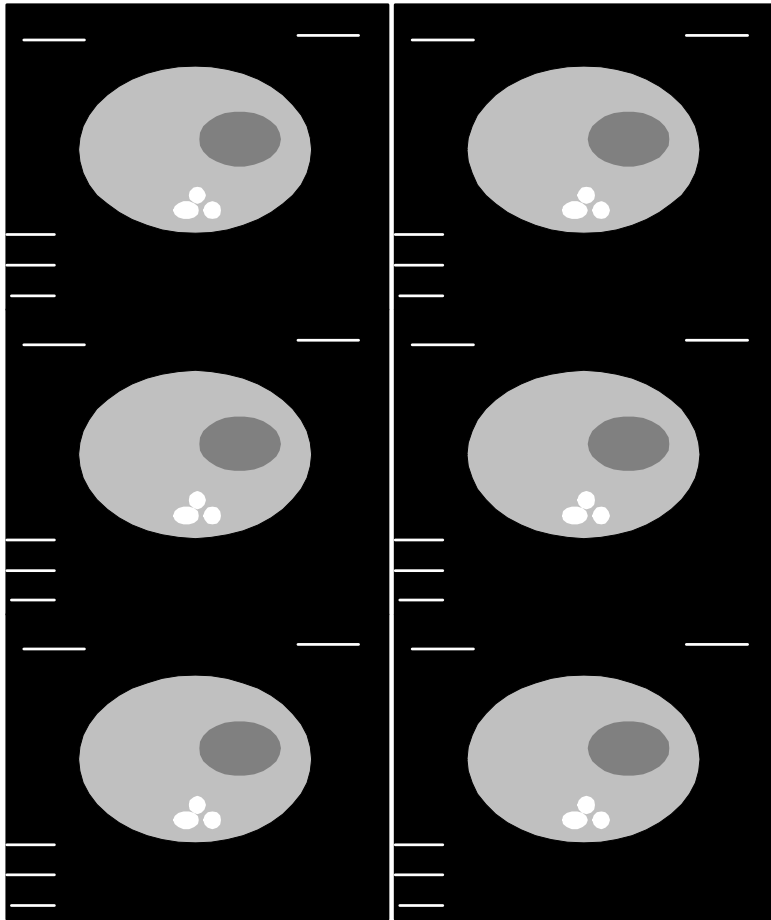
X-ray rooms from examination to reading around 1990



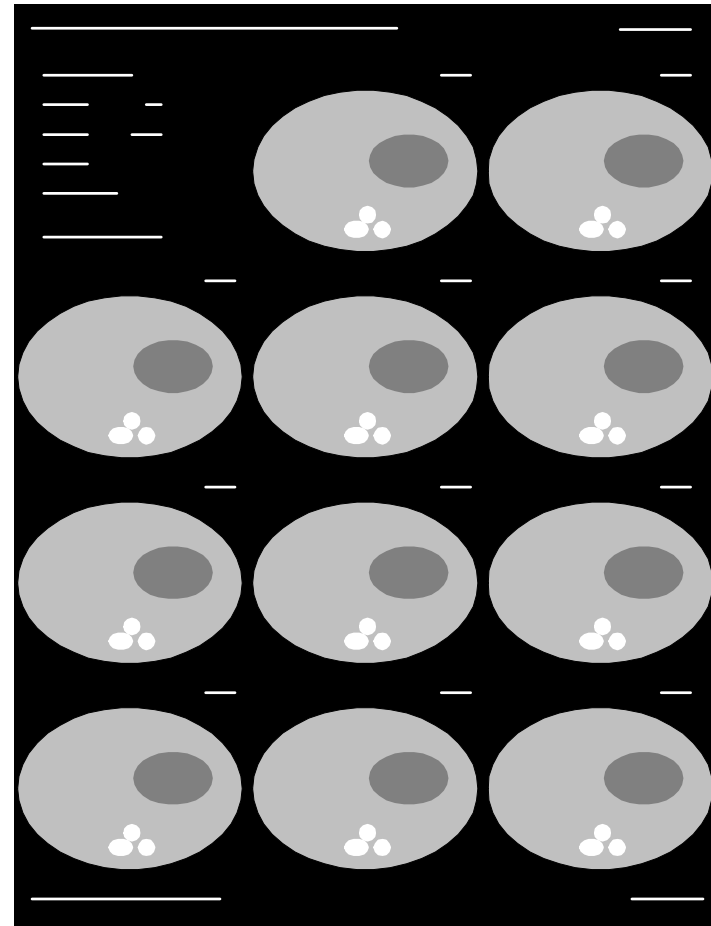
Product Innovation: Easyvision applied as printserver



Market innovation: optimized film



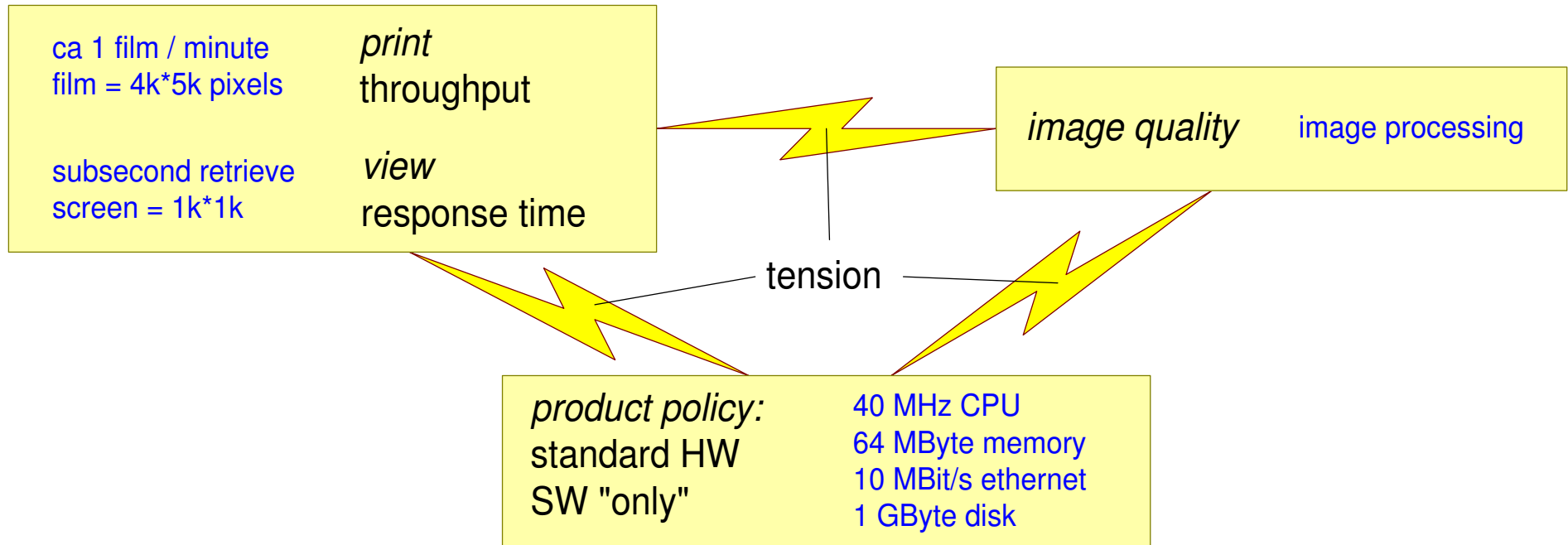
old: screen copy



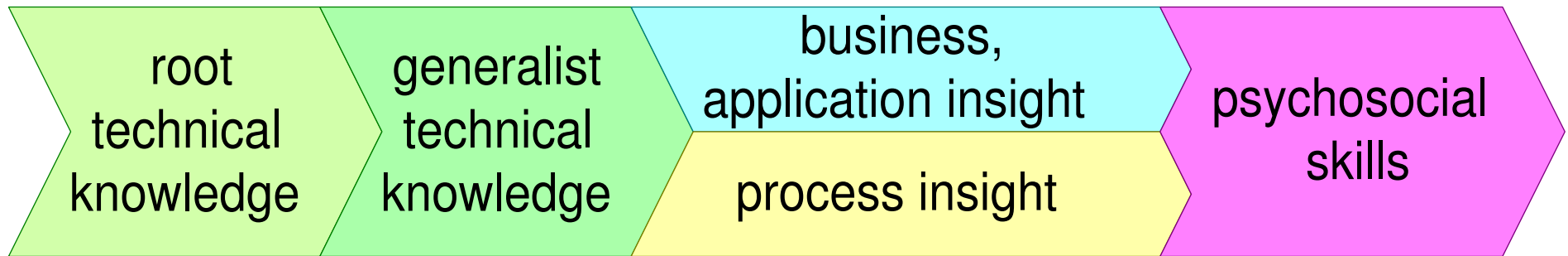
new: SW formatting

20 to 50% less film needed

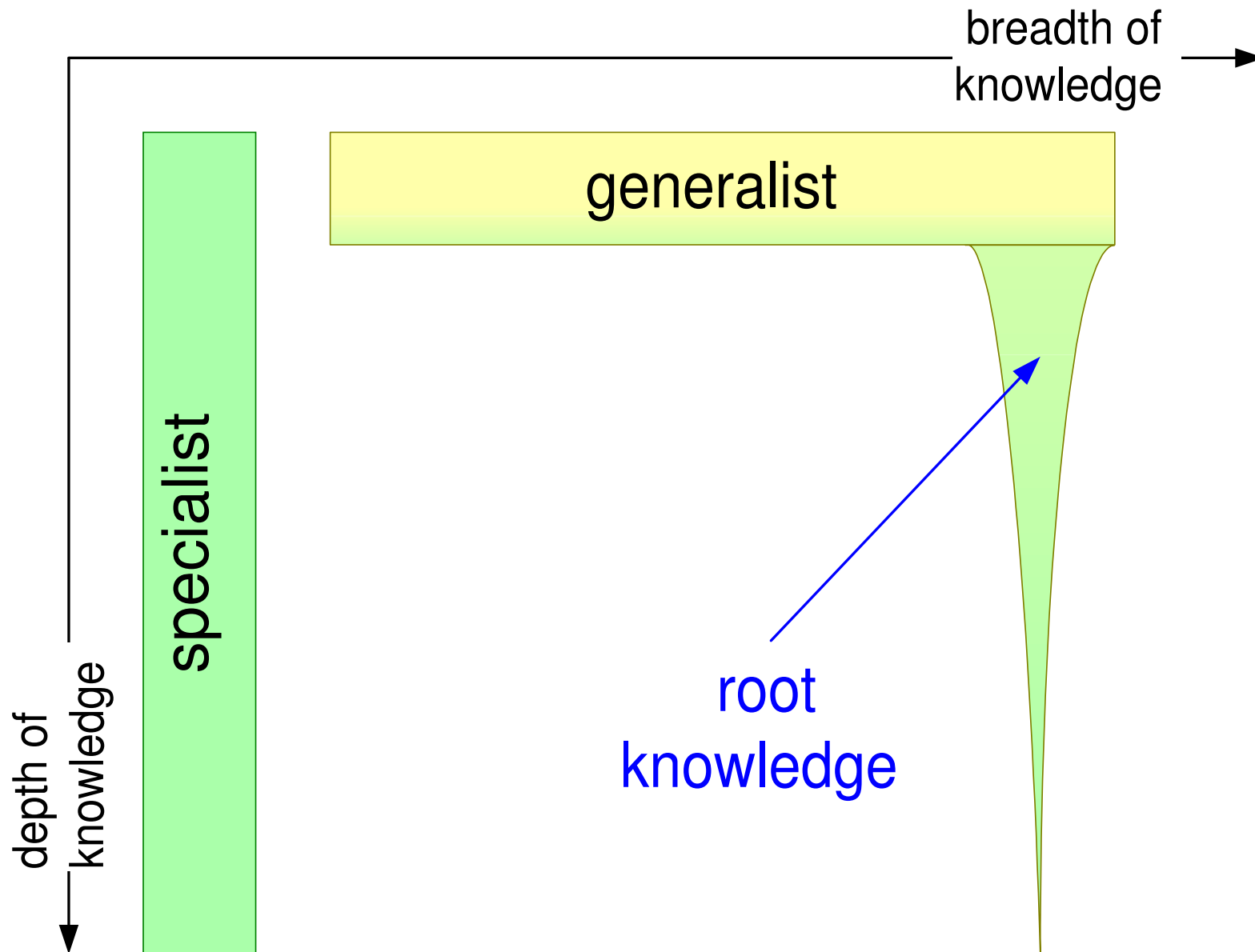
Technology innovation challenges



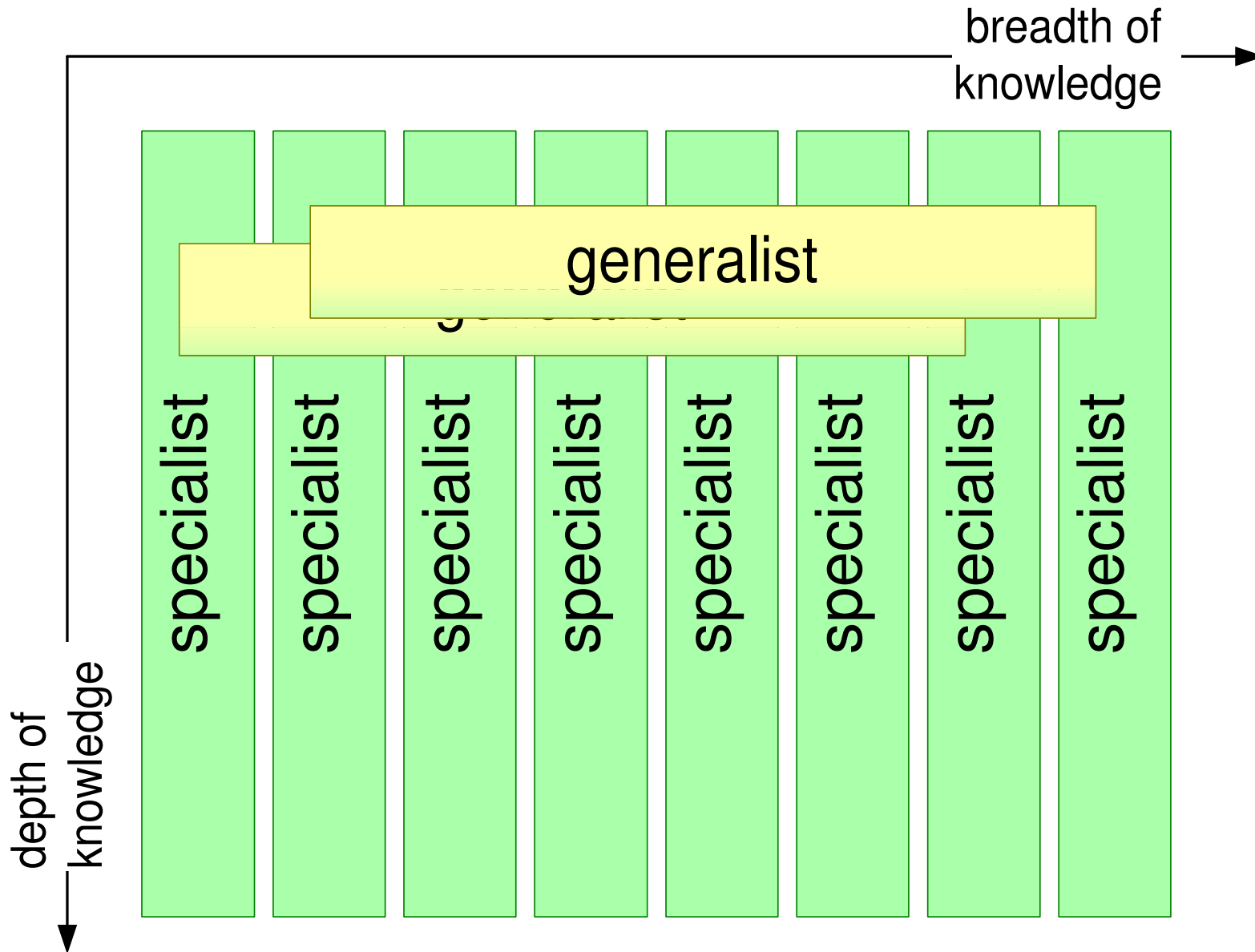
Typical Growth of a System Architect



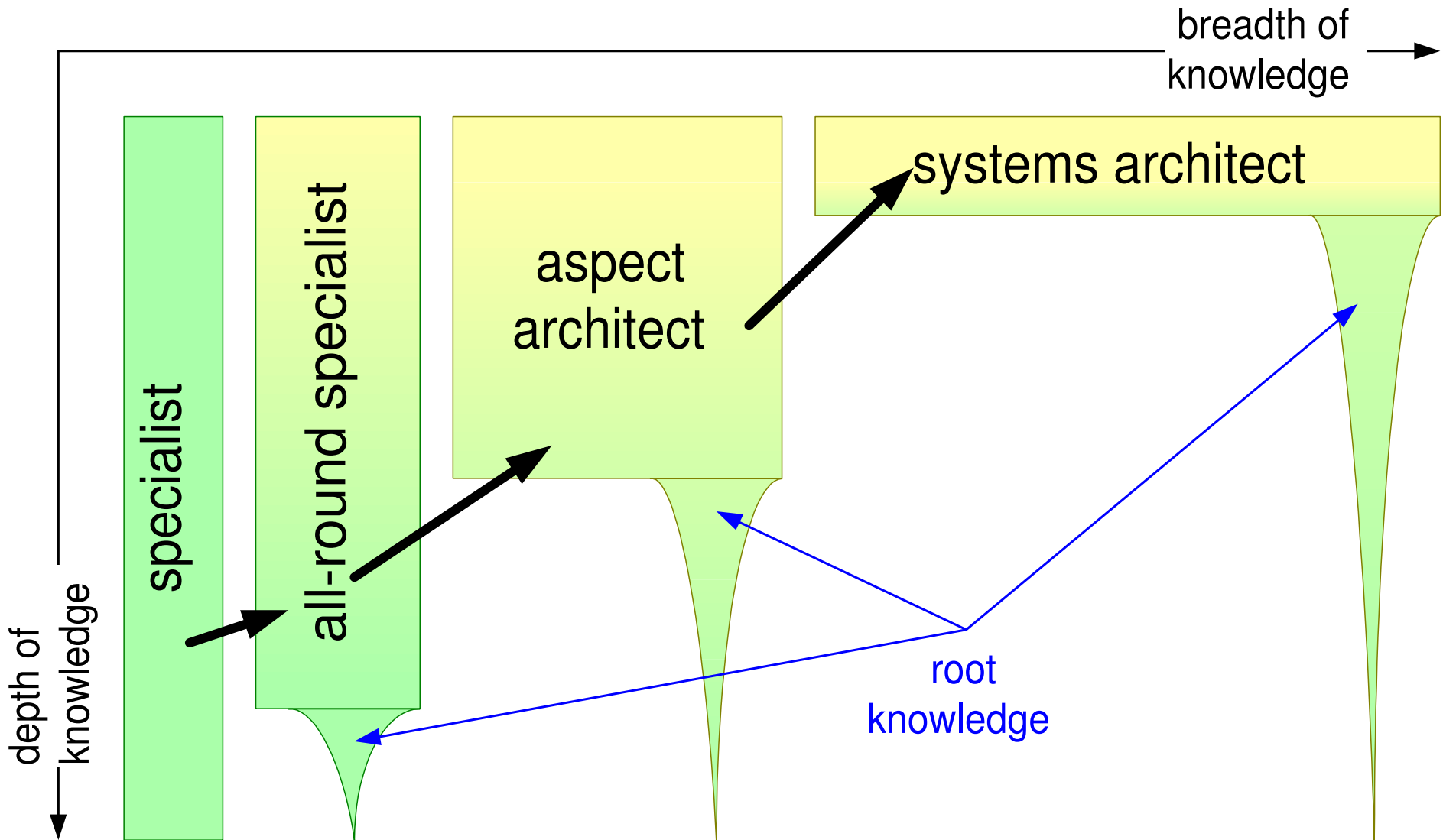
Generalist versus Specialist



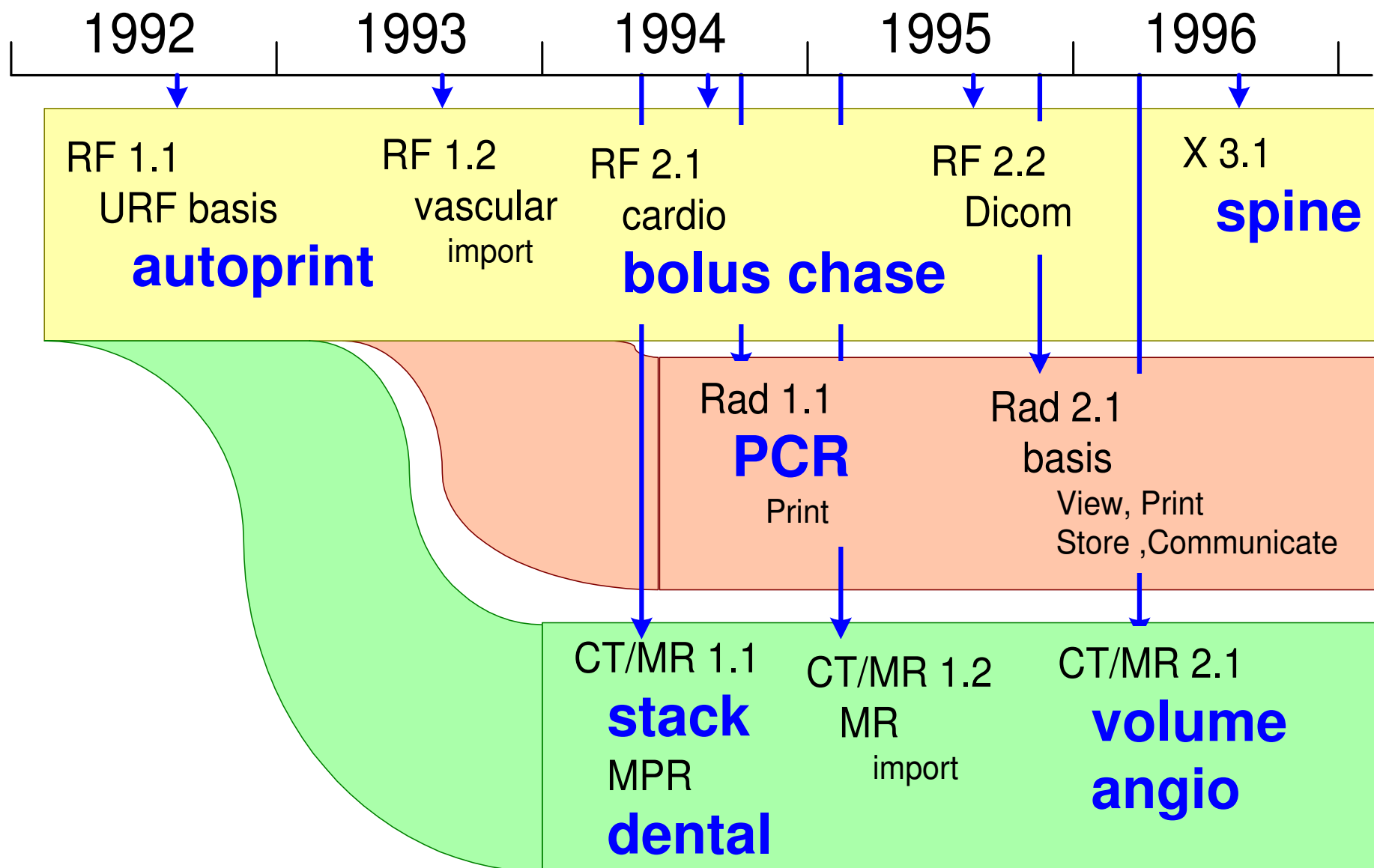
Generalists and Specialists are Complementary



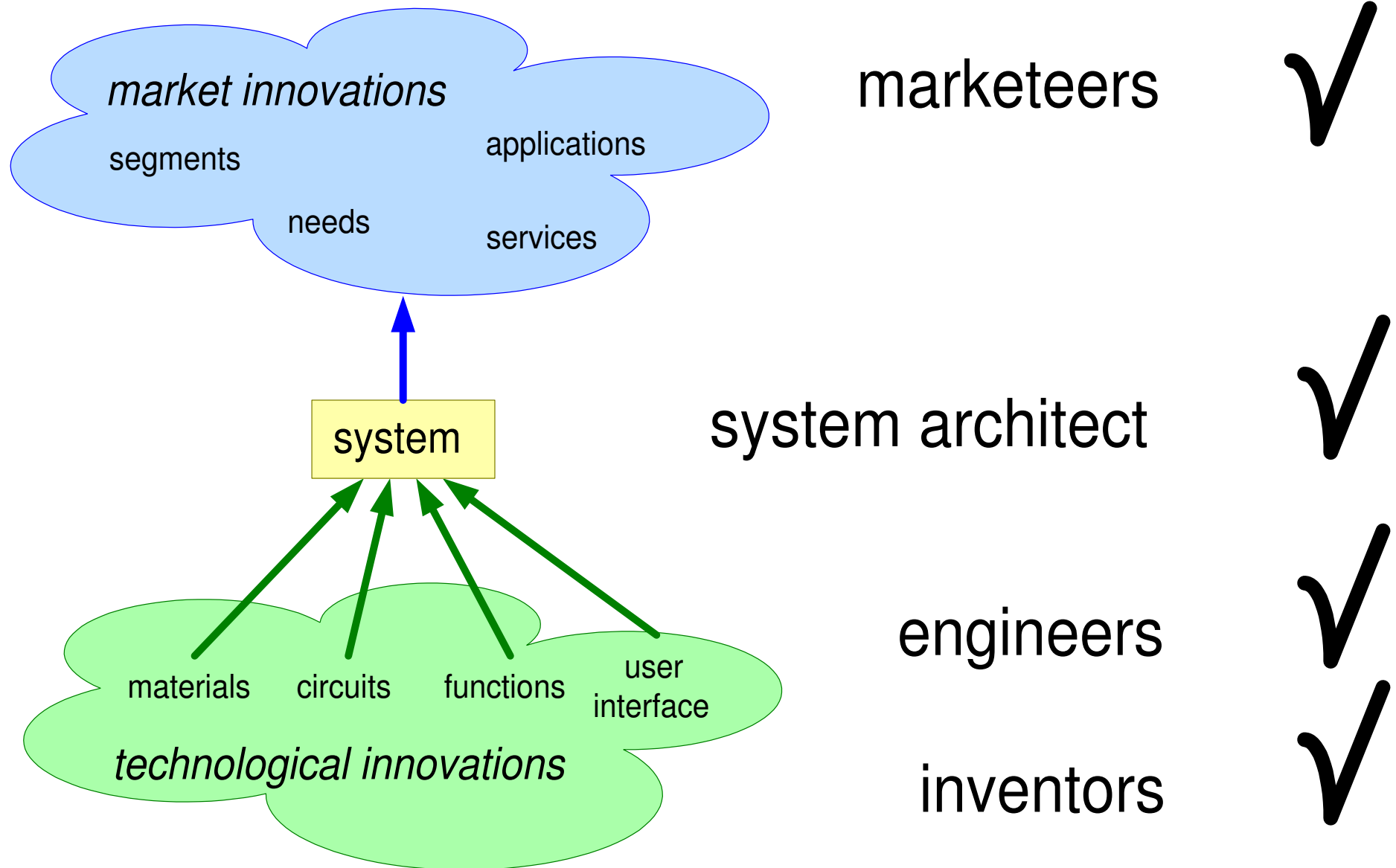
Spectrum from Specialist to System Architect



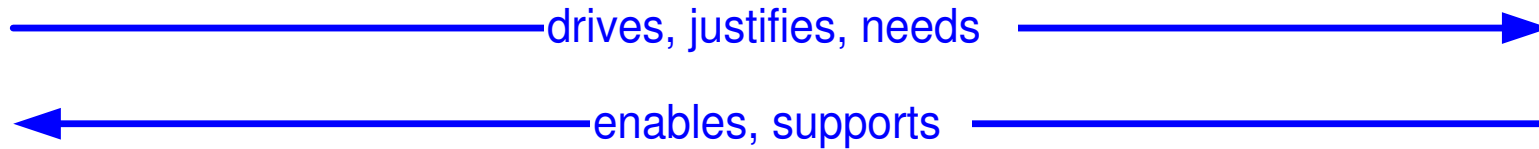
More innovations in Medical Imaging



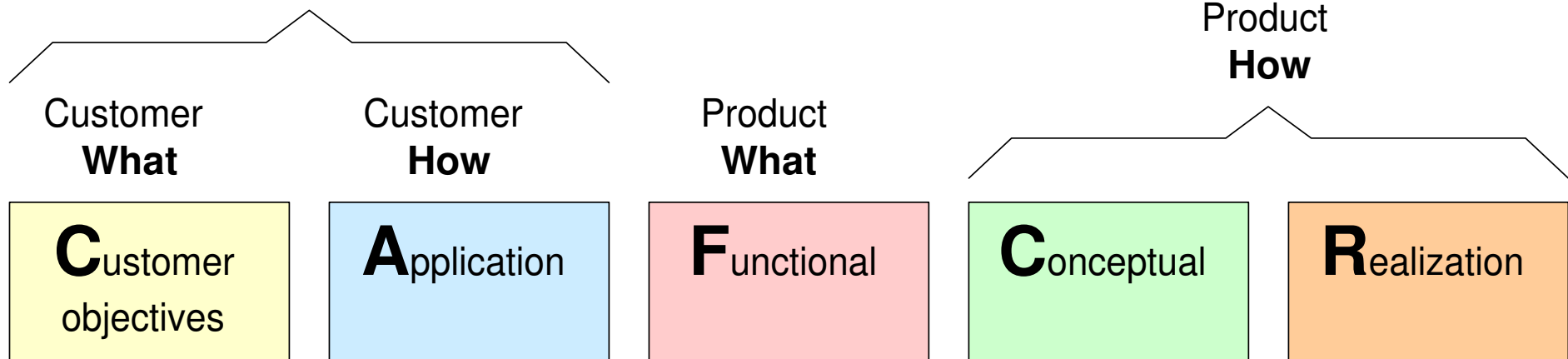
Key success factor 1: innovation by all parties



The "CAFCR" model

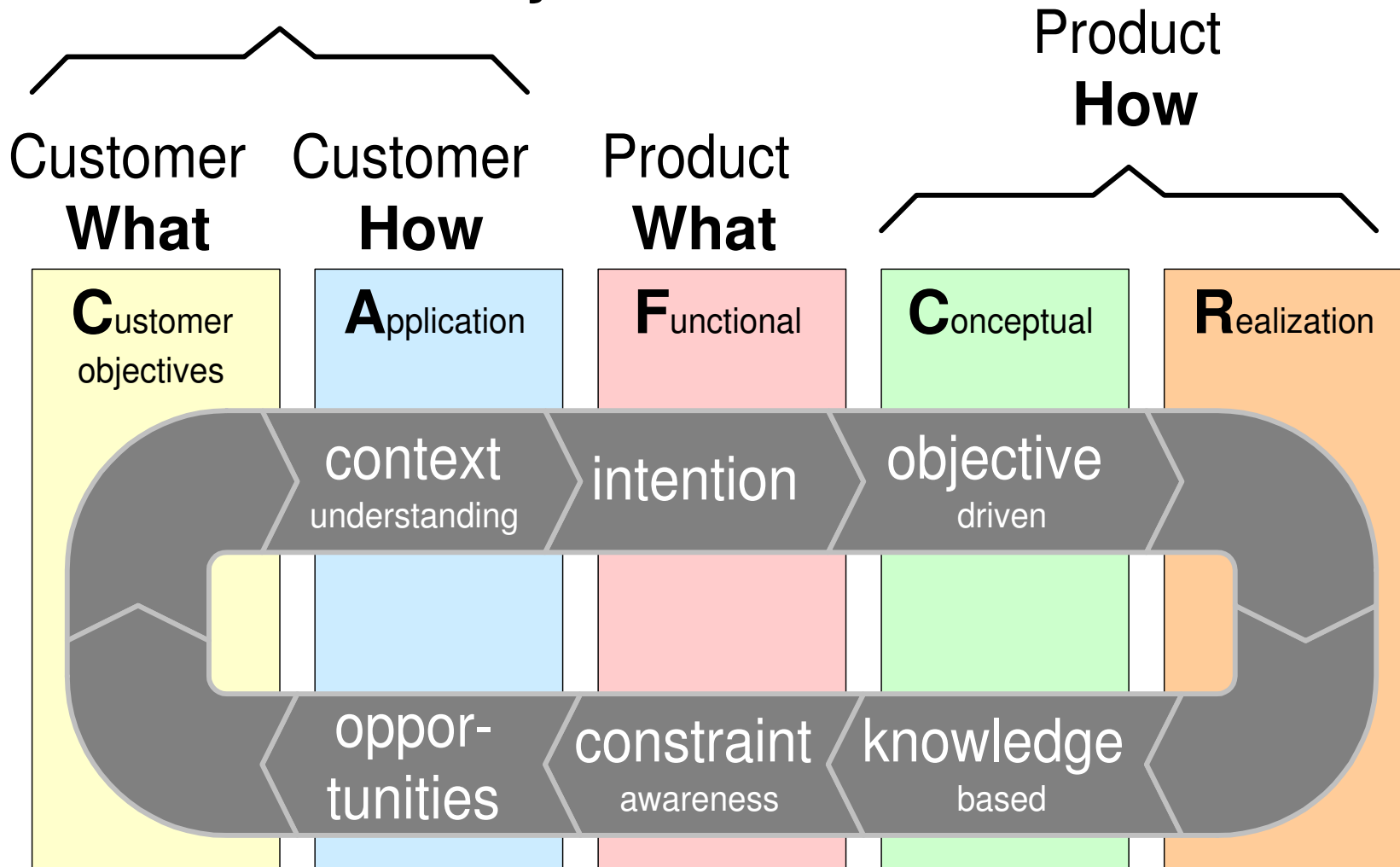


What does Customer need
in Product and **Why?**

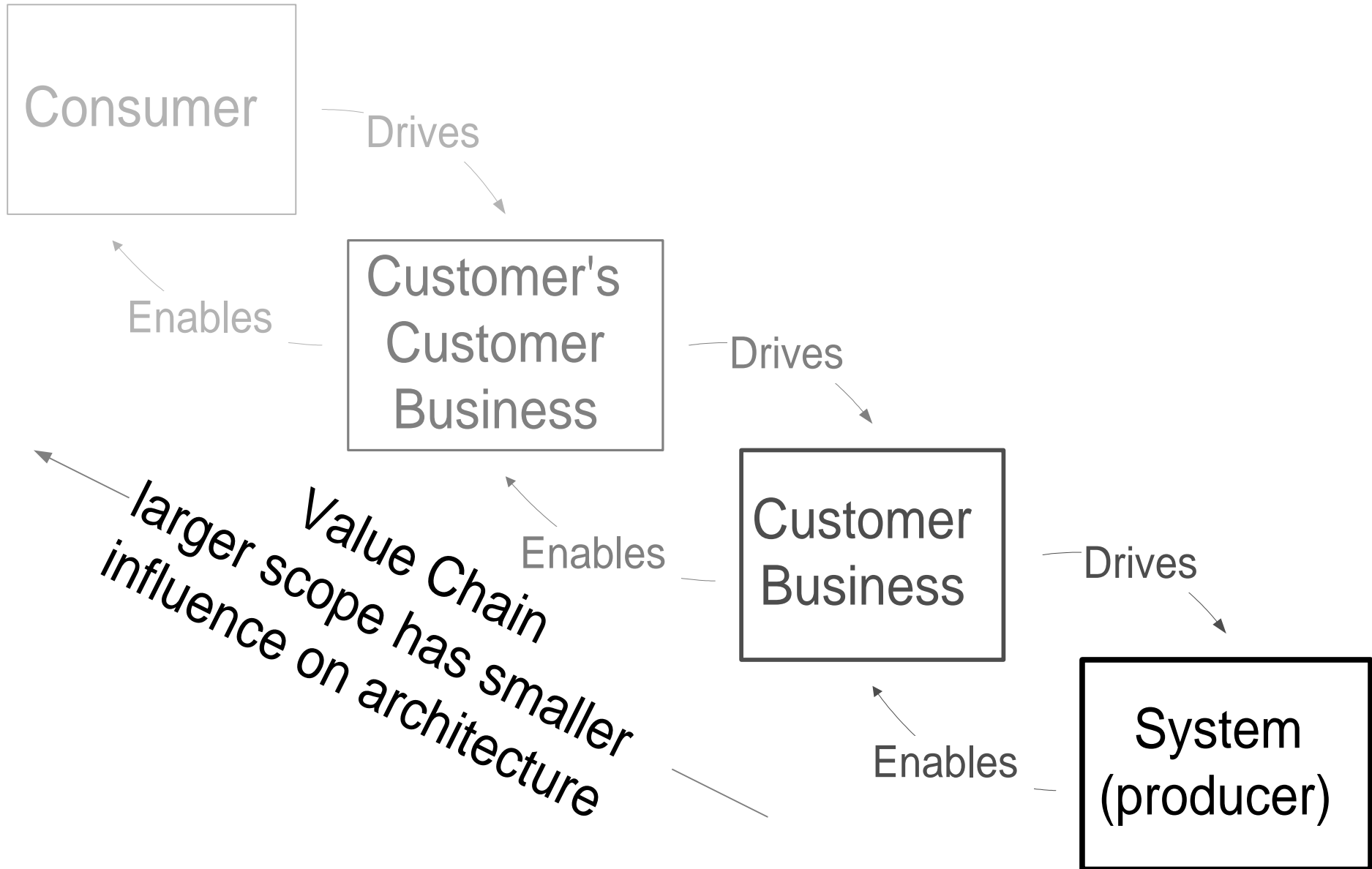


Integrating CAFCR

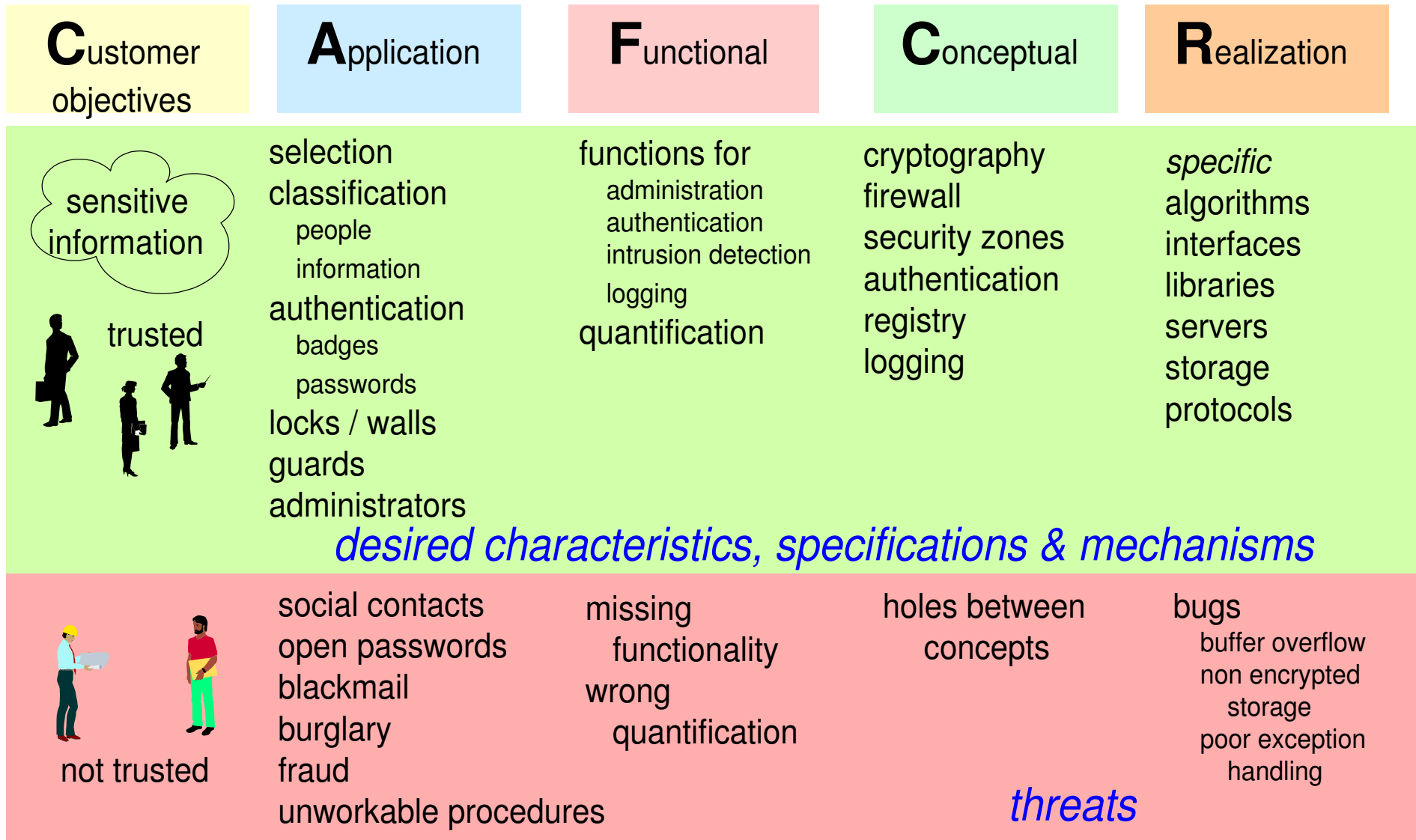
What does Customer need
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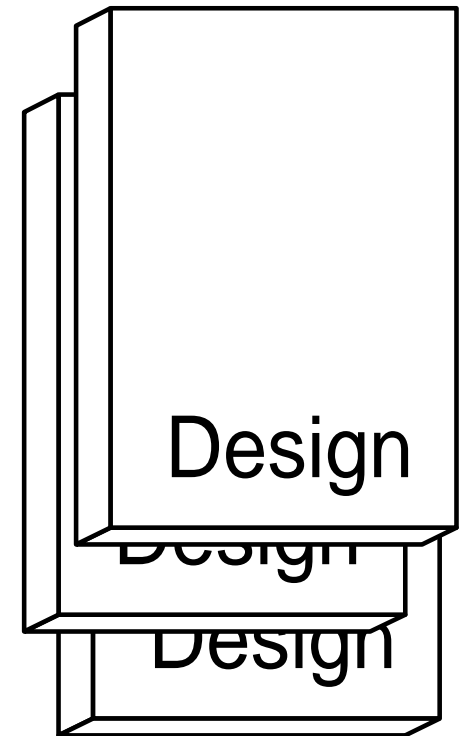
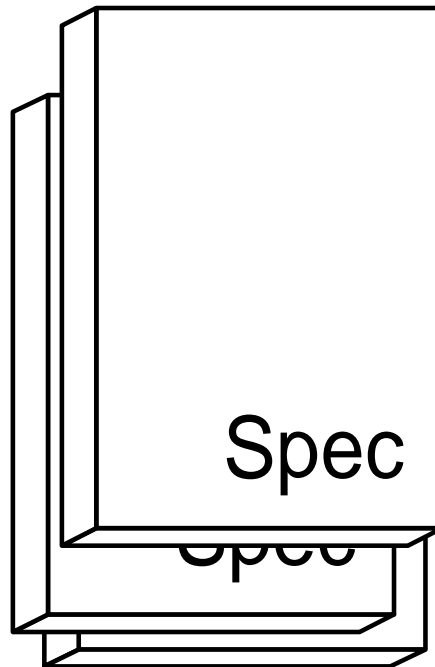
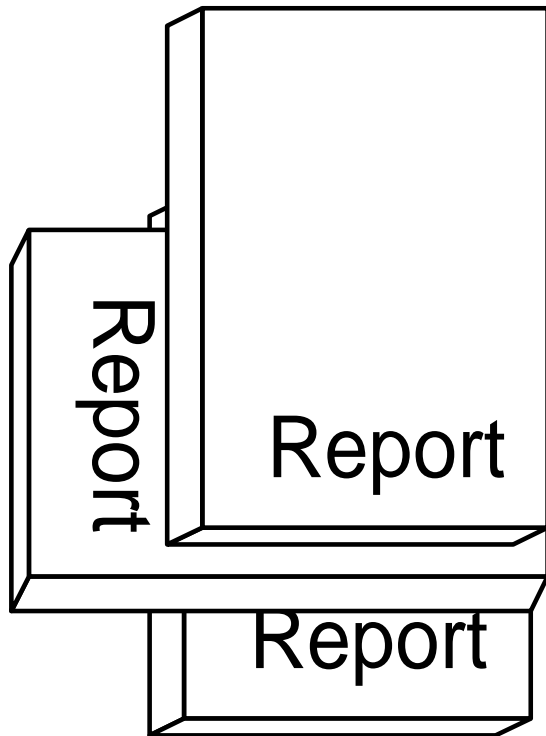
CAFCR can be applied recursively



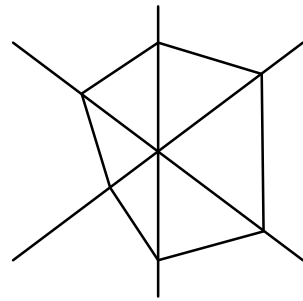
CAFCR applied on Security



Deliverables of the System Architect

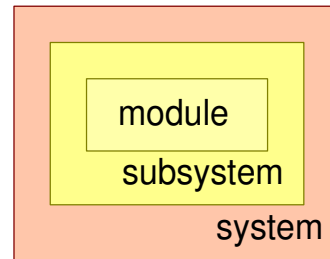


Responsibilities of the System Architect



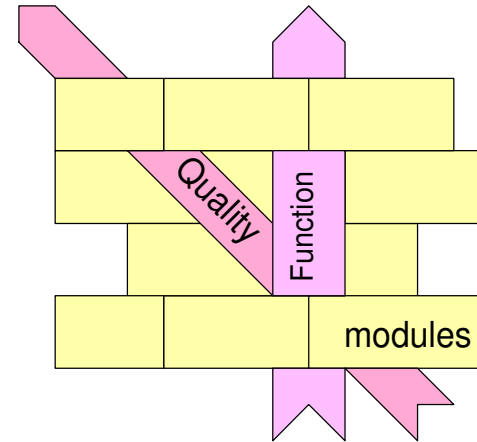
Balance

Requirement
Spec
Design
Realization



Consistency

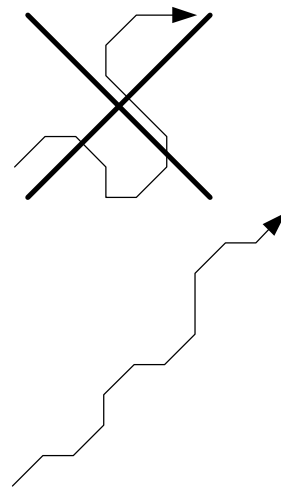
Decomposition
Integration



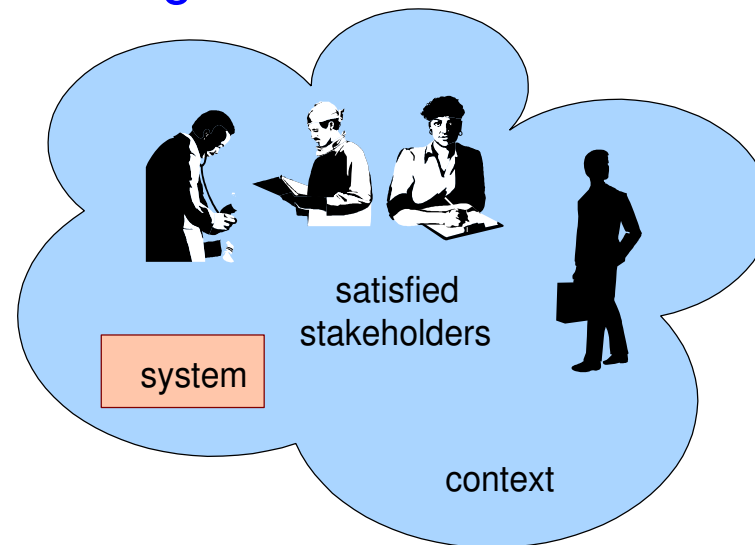
Overview

KISS

Elegance
Simple

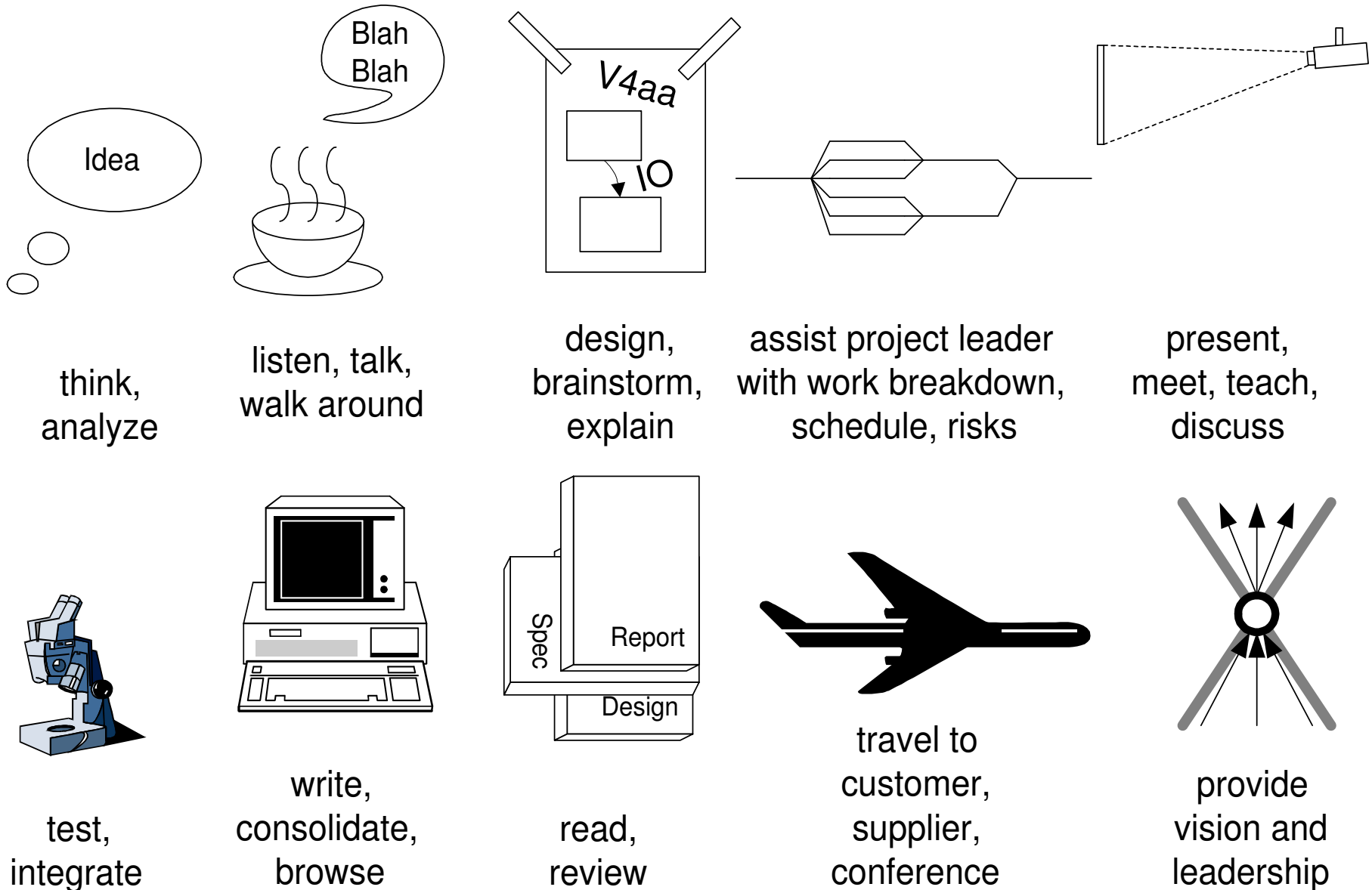


Integrity



Fitting

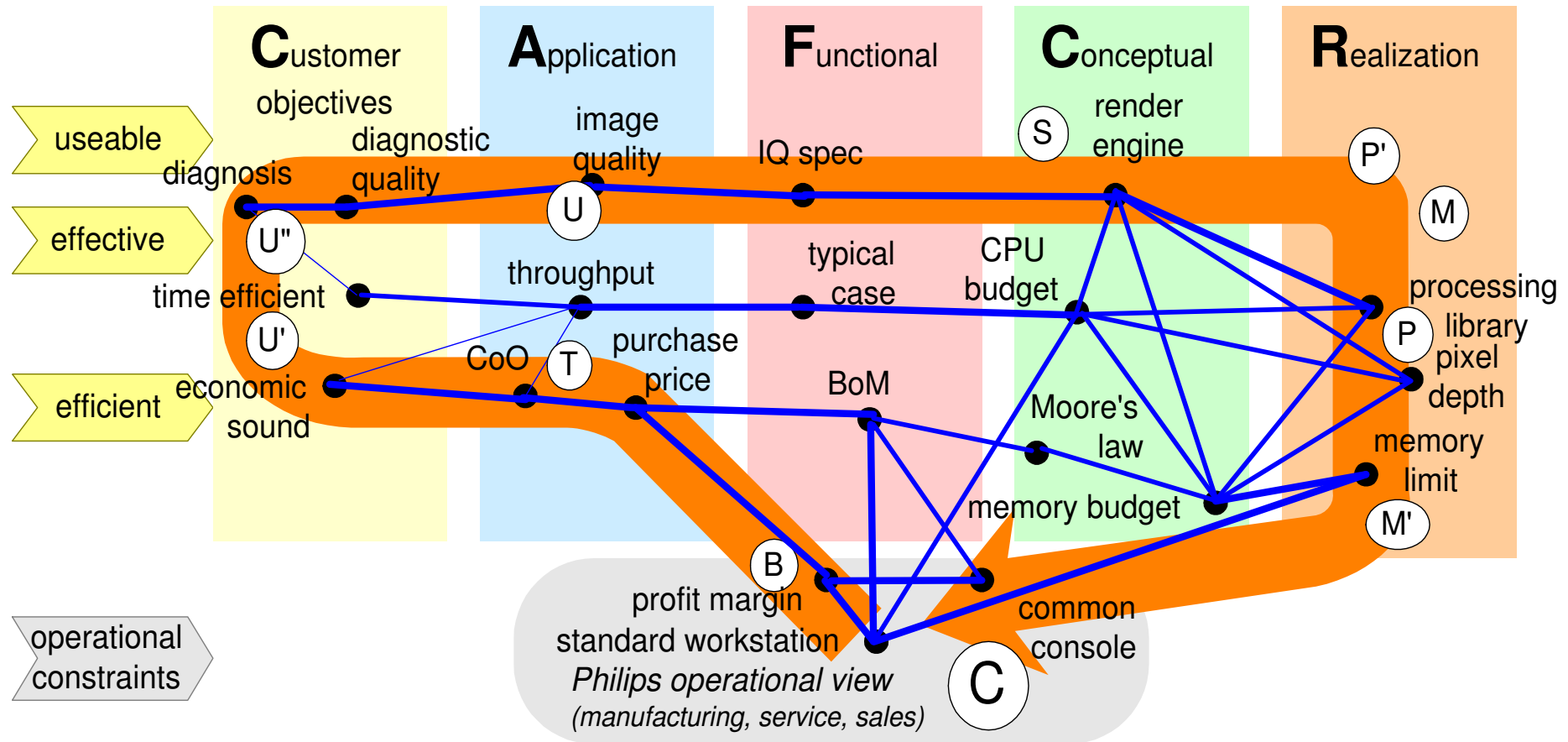
What does the System Architect do?



From Detail to Overview

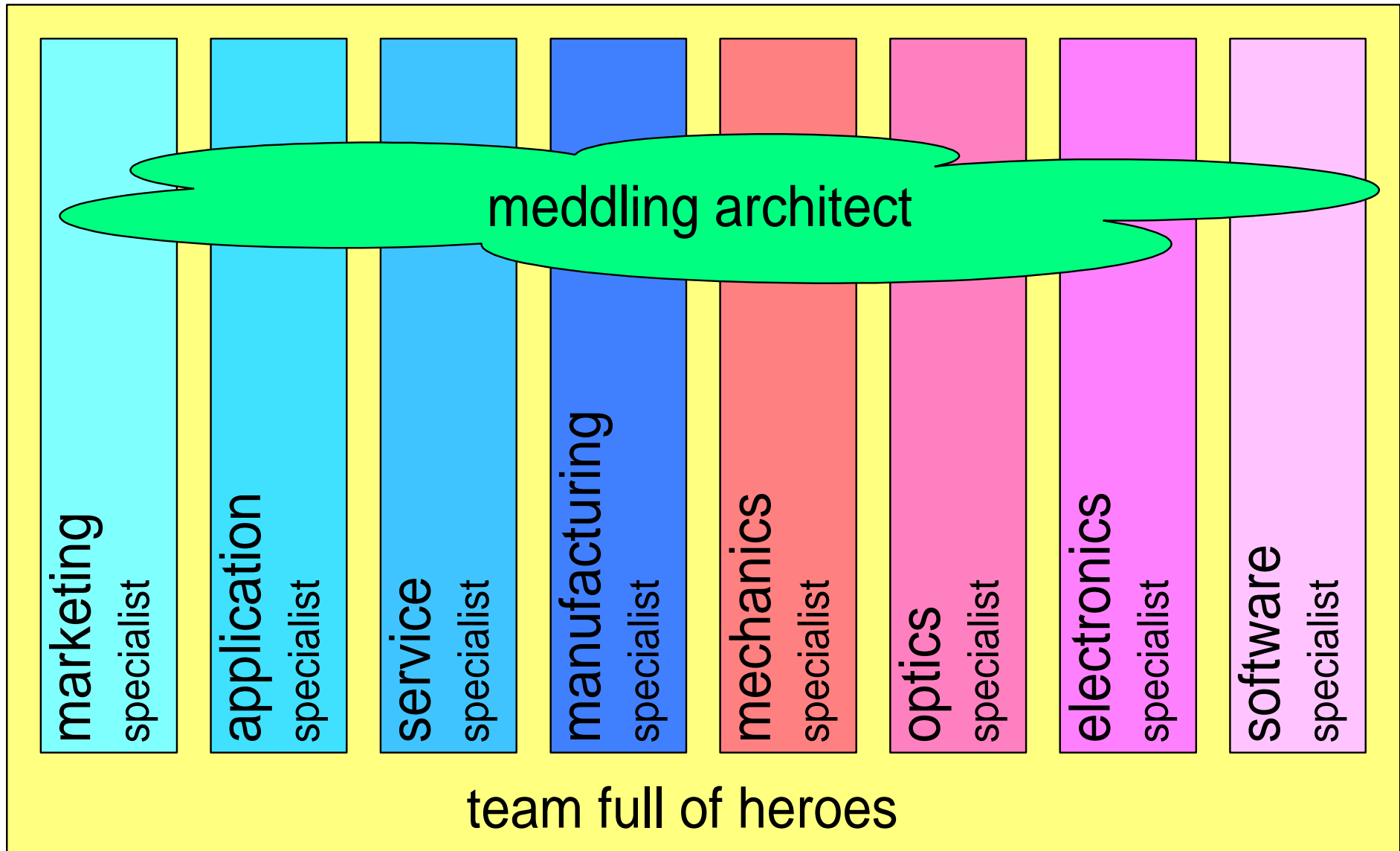
| | Quantity per year (order-of- magnitude) | architect time per item | |
|-------------------------------------|--|-------------------------------|--------------|
| consolidation in deliverables | driving views | 10 | 100 h |
| meetings | shared issues | 10^2 | 1 h |
| informal contacts | touched details | 10^4 | 0.5 – 10 min |
| sampling scanning | 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

