Software Productivity for Consumer Appliances

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Abstract

Technological developments, such as miniaturization and convergence have a strong impact on the form, function and content of consumer appliances. The appliance makers are struggling with the consequences, especially with the exponential increasing SW effort.
The trends and the impact on consumer appliances are discussed. Then the software effort problem is analyzed and solution directions for the SW productivity problems are explored.

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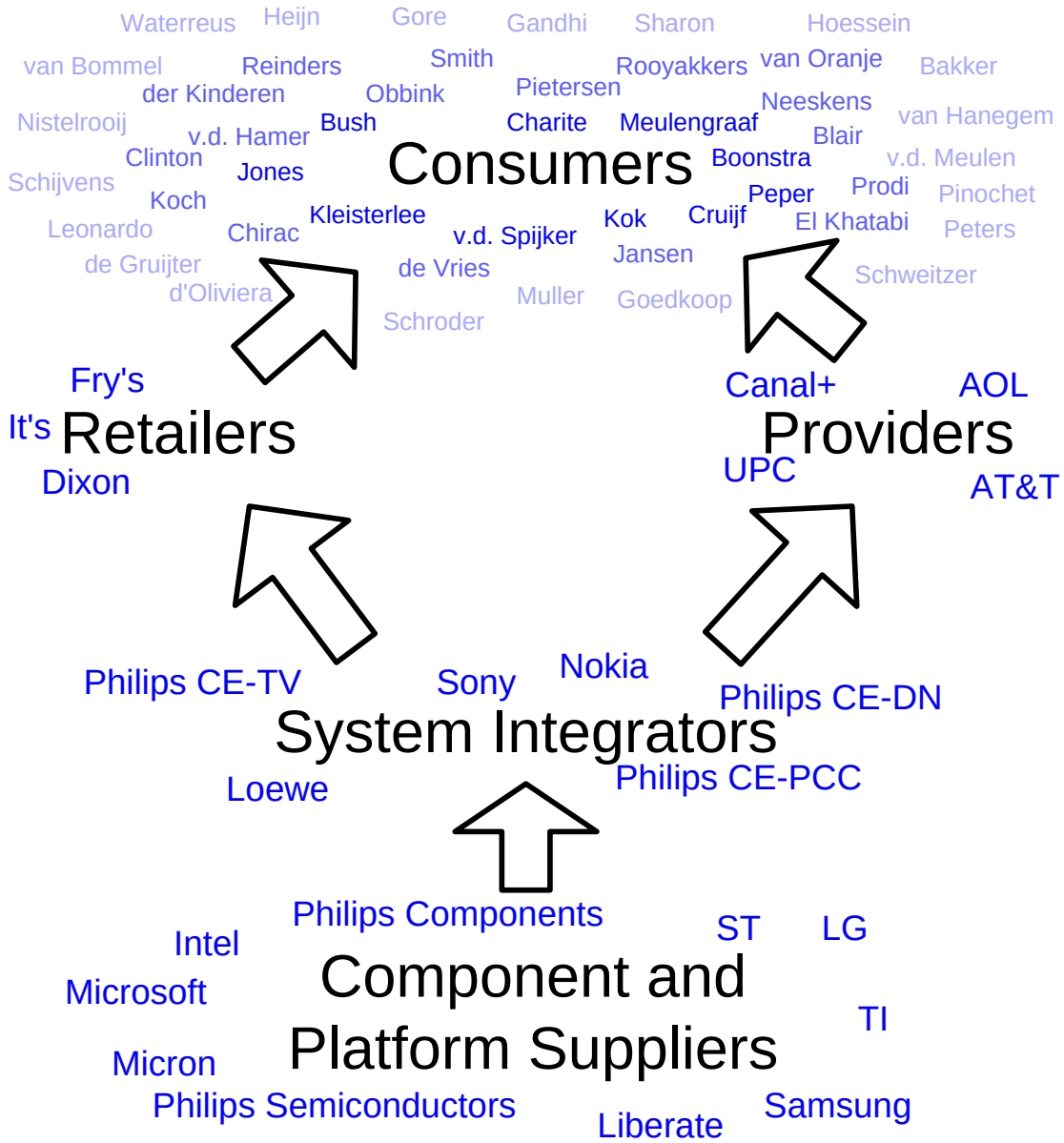
status: planned
version: 0

logo
TBD

Value chain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Pietersen
Neeskens
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Bush
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van Hanegem
v.d. Hamer
Blair
Clinton
Consumers
Boonstra
v.d. Meulen
Schijvens
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Prodi
Pinochet
Koch
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Kok
Cruijf
El Khatabi
Leonardo
Chirac
v.d. Spijker
Peters
de Gruijter
de Vries
Jansen
Schweitzer
d'Oliviera
Muller
Goedkoop
Schroder
Fry's
Canal+
AOL
It's
Retailers
Providers
Dixon
UPC
AT&T
Philips CE-TV
Sony
Nokia
Philips CE-DN
System Integrators
Loewe
Philips CE-PCC
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LG
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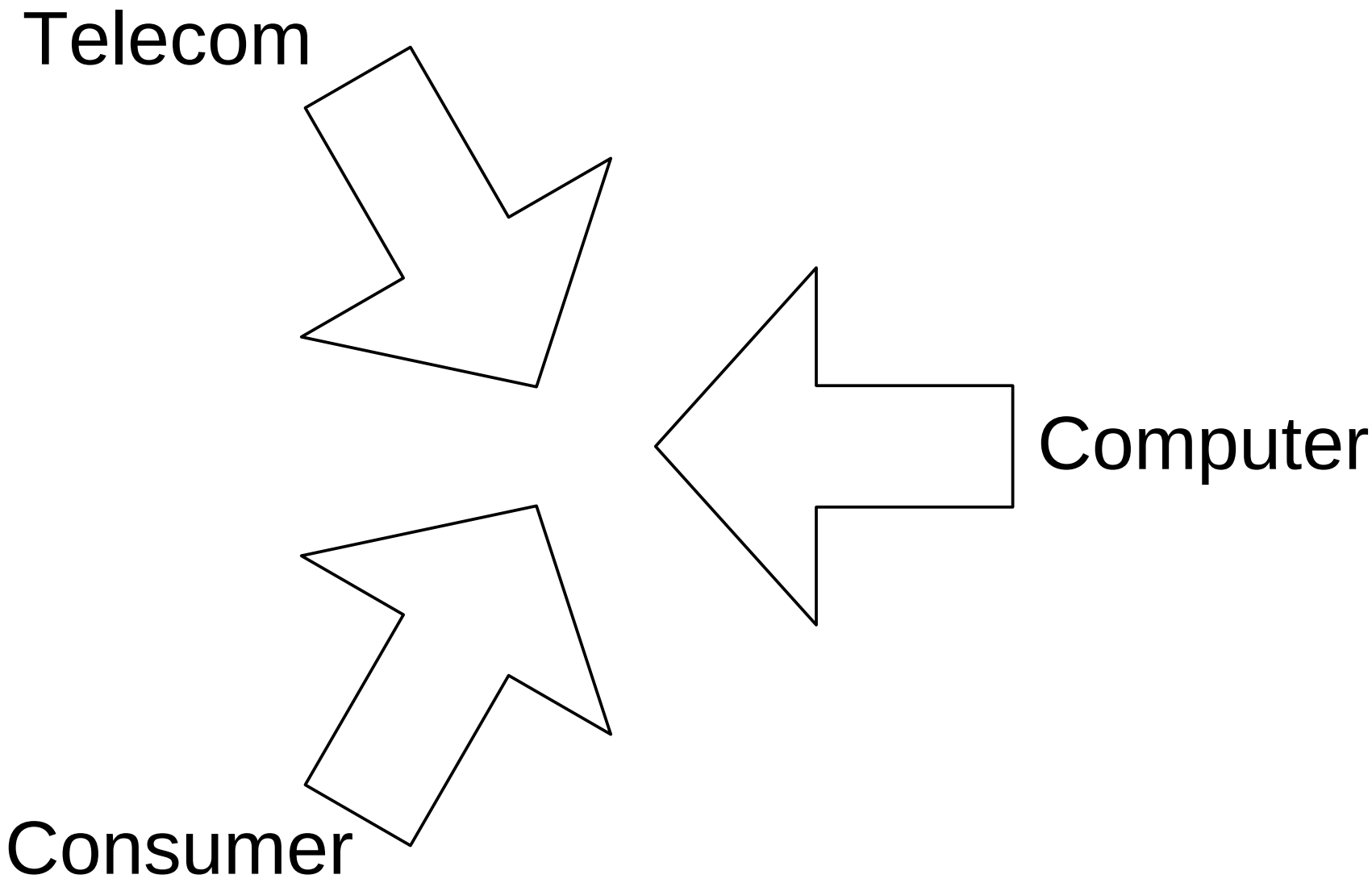
Microsoft
Component and
Platform Suppliers
TI
Micron
Philips Semiconductors
Liberate
Samsung

Convergence



Integration and Diversity

GSM phone

firewall

dvd

audio microset

pda

watch

sailboat

surveillance camera

cable modem

set top box

headphone

pen

garment

car

camera

speech

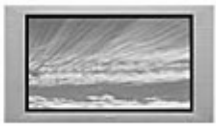
mp3

television

car navigation

computer

games


flat display

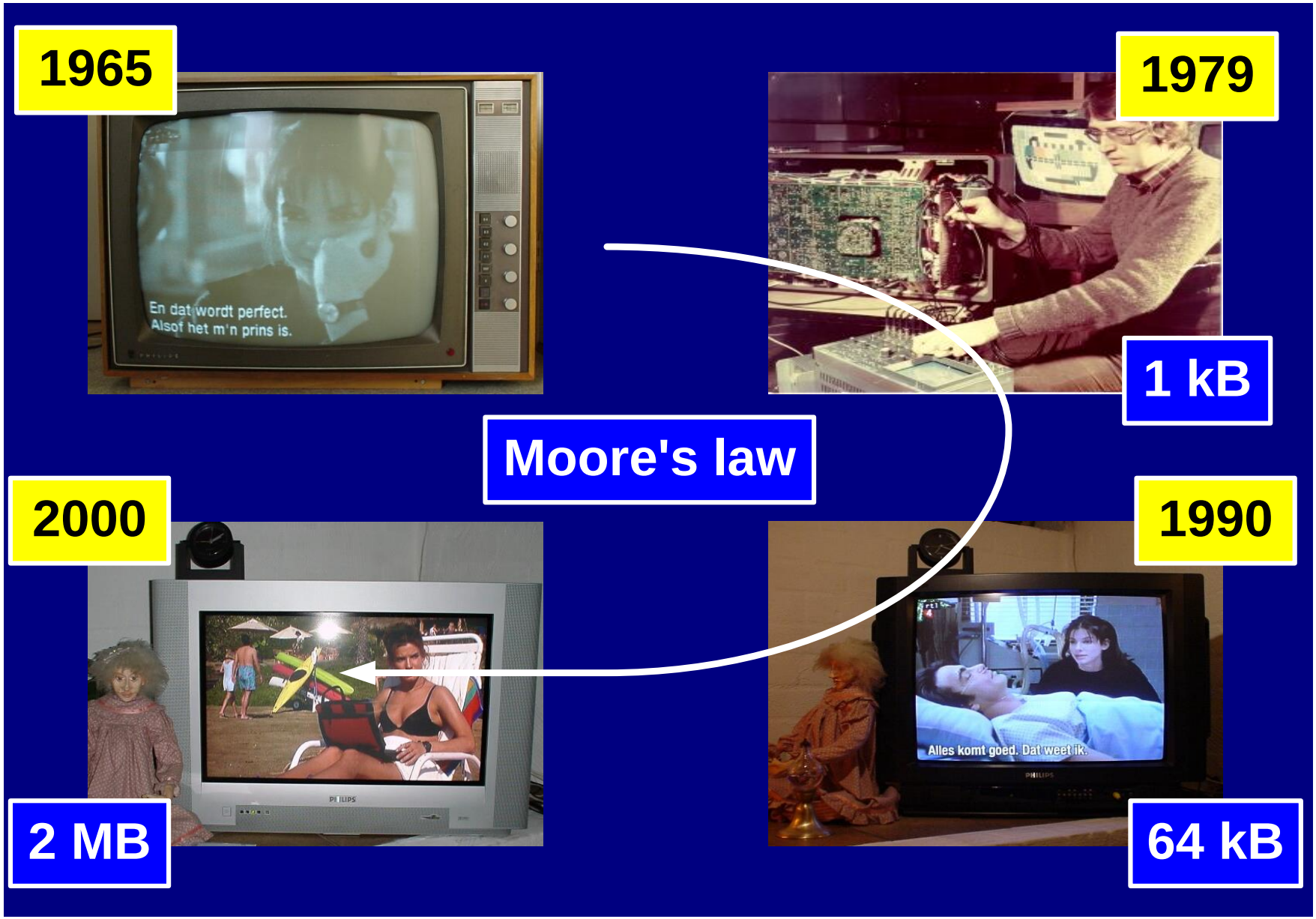
Communicator

Ambient Intelligence living room

Uncertainty (Dot.Com effect)

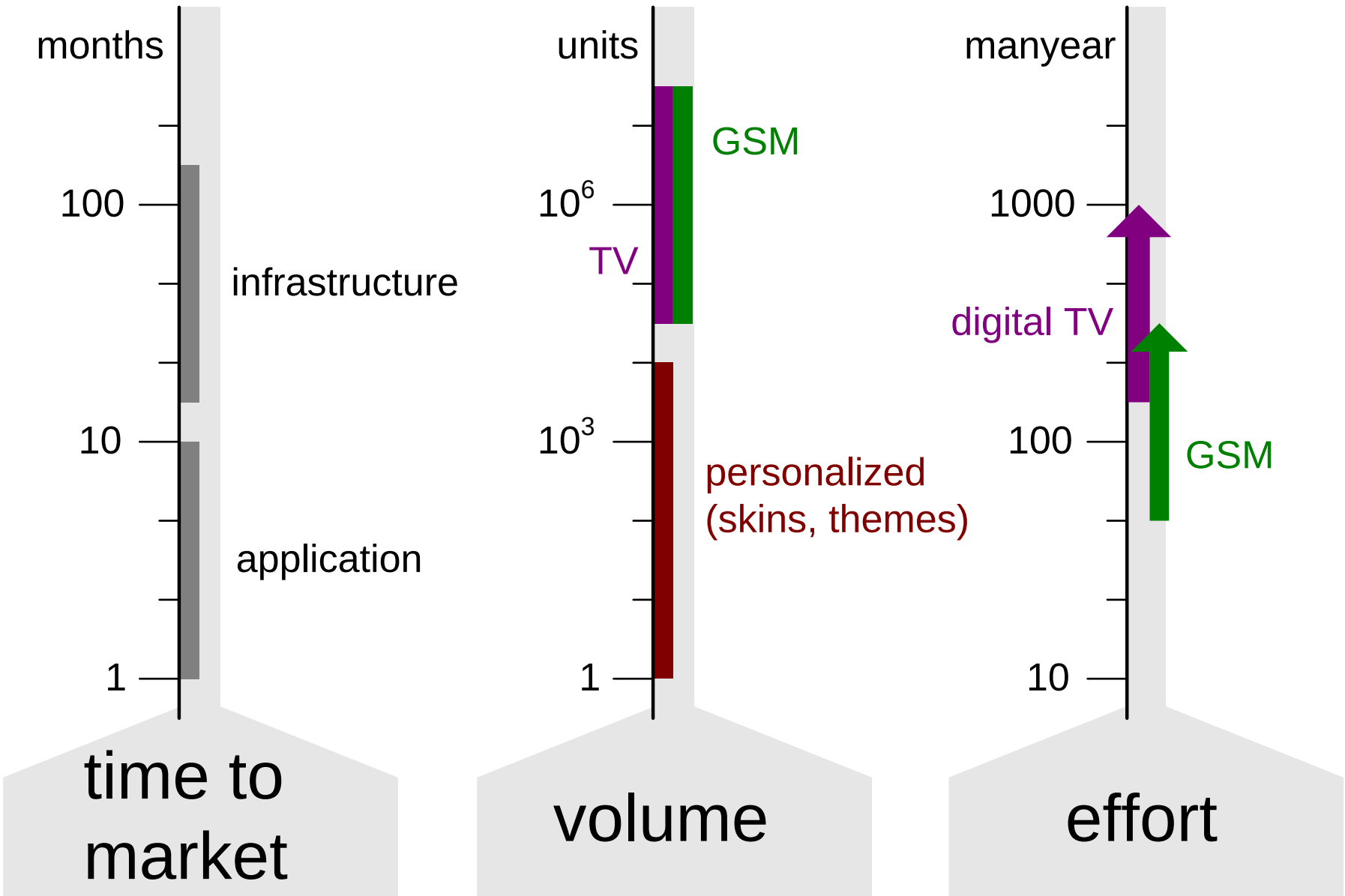
source: BigChart.com
dd march 19, 2001

Moore’s law

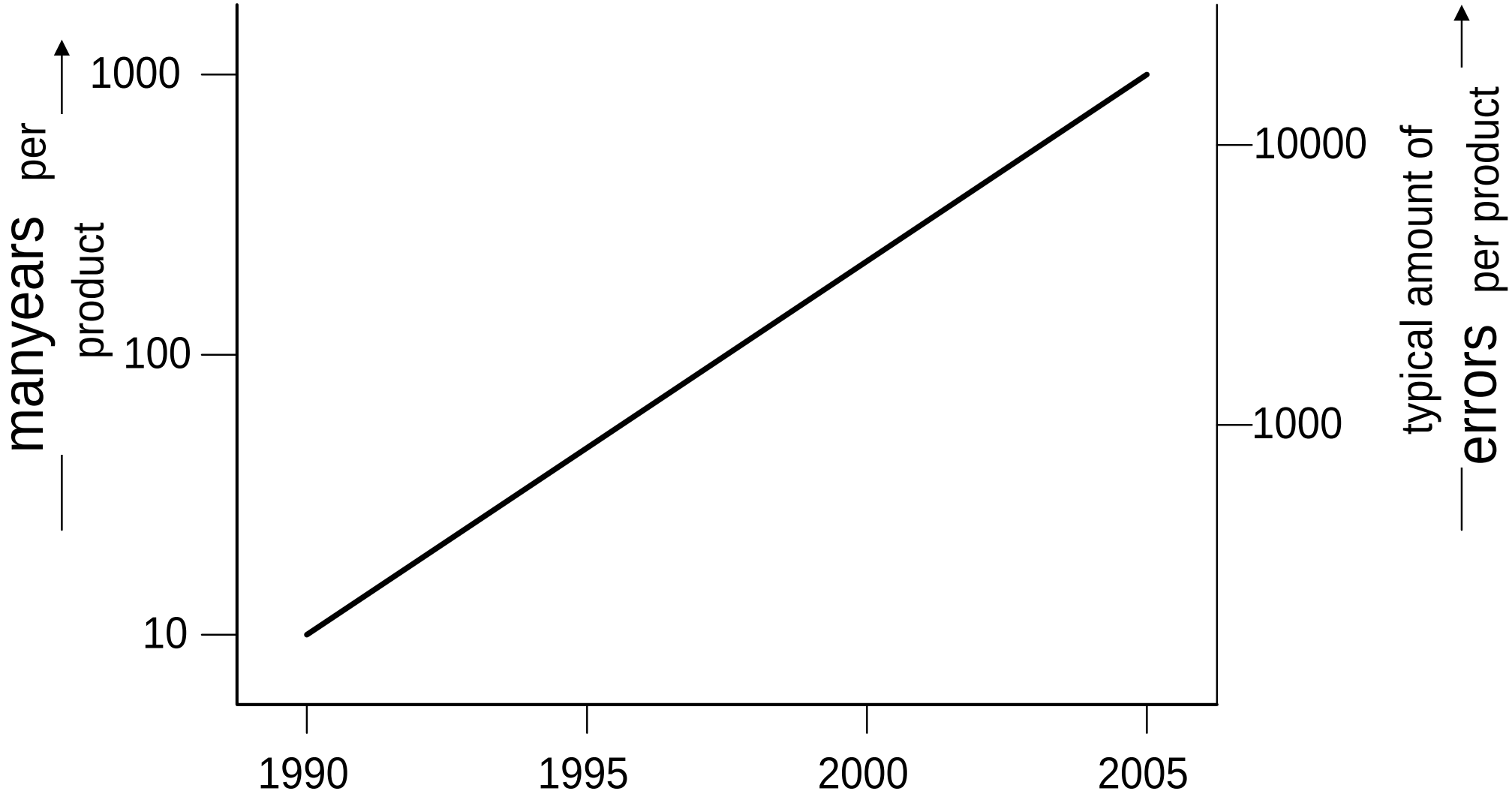


From: COPA tutorial, Rob van Ommering

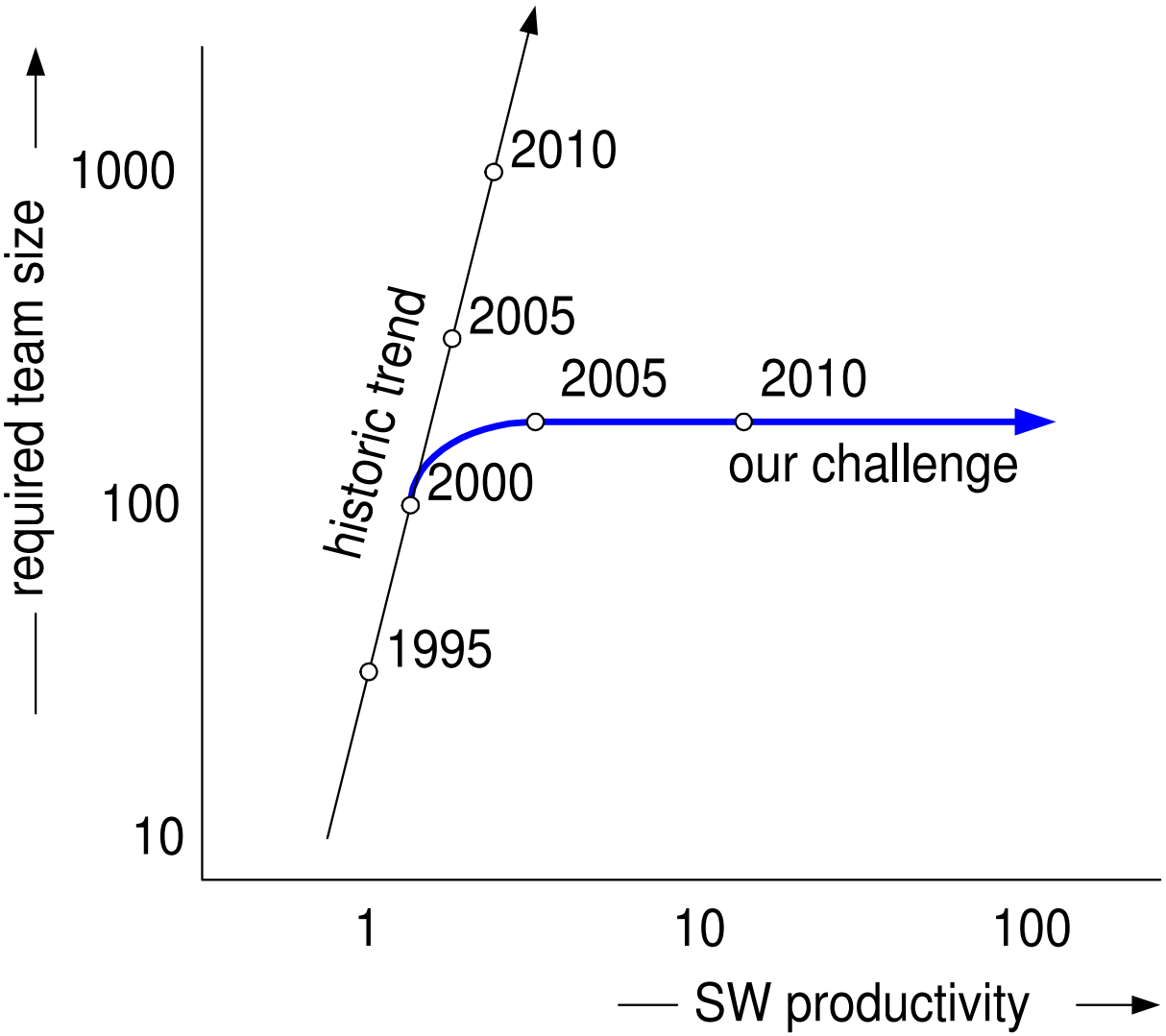
System Integrator Problem Space - Business



Problem: increasing SW size, decreasing reliability?



System Integrator size of workforce



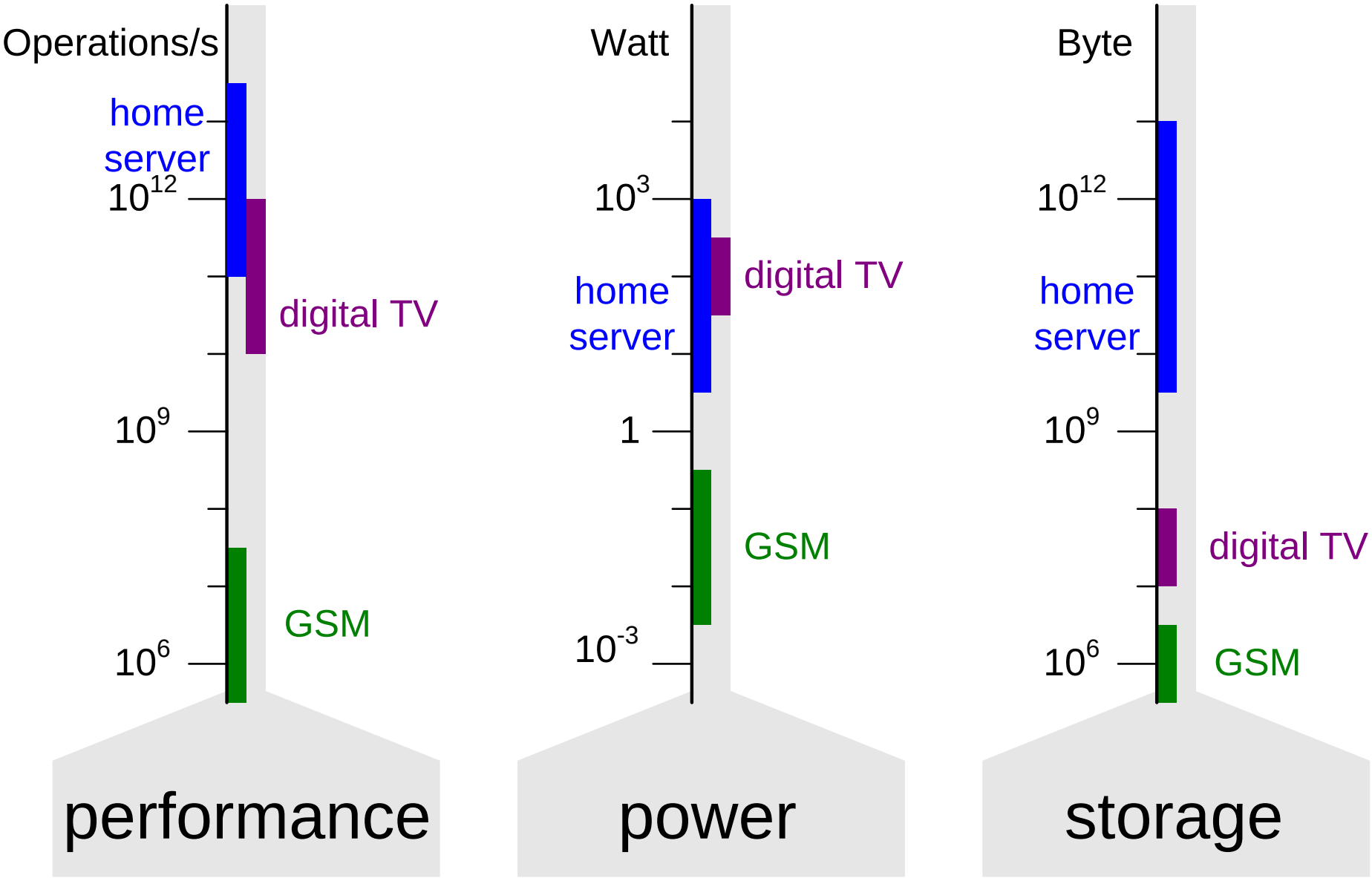
Manage large PCP teams of > 1000 people

or

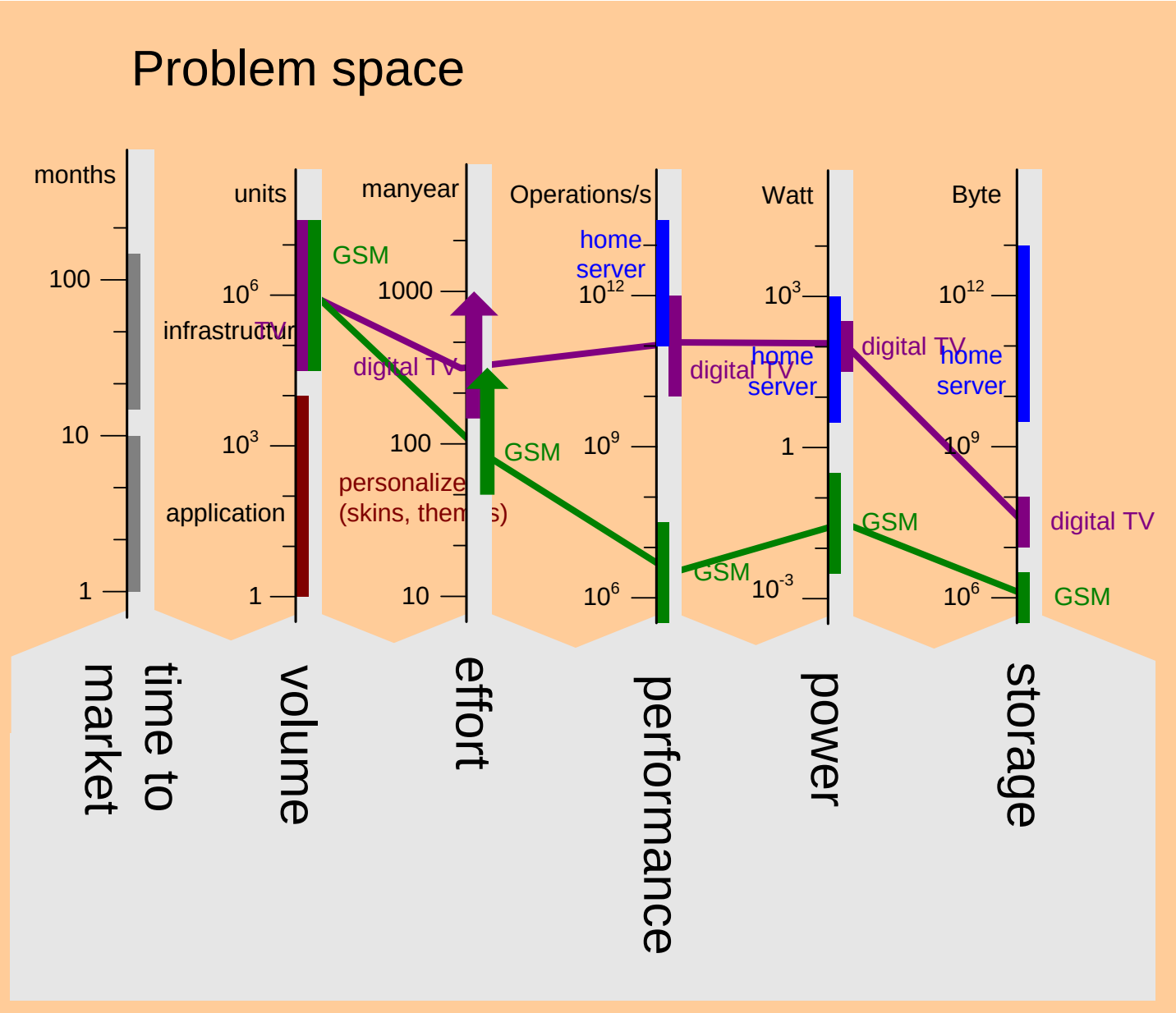
Significantly increase SW productivity

from: Ad Huijser
Philips Software Conference 2001

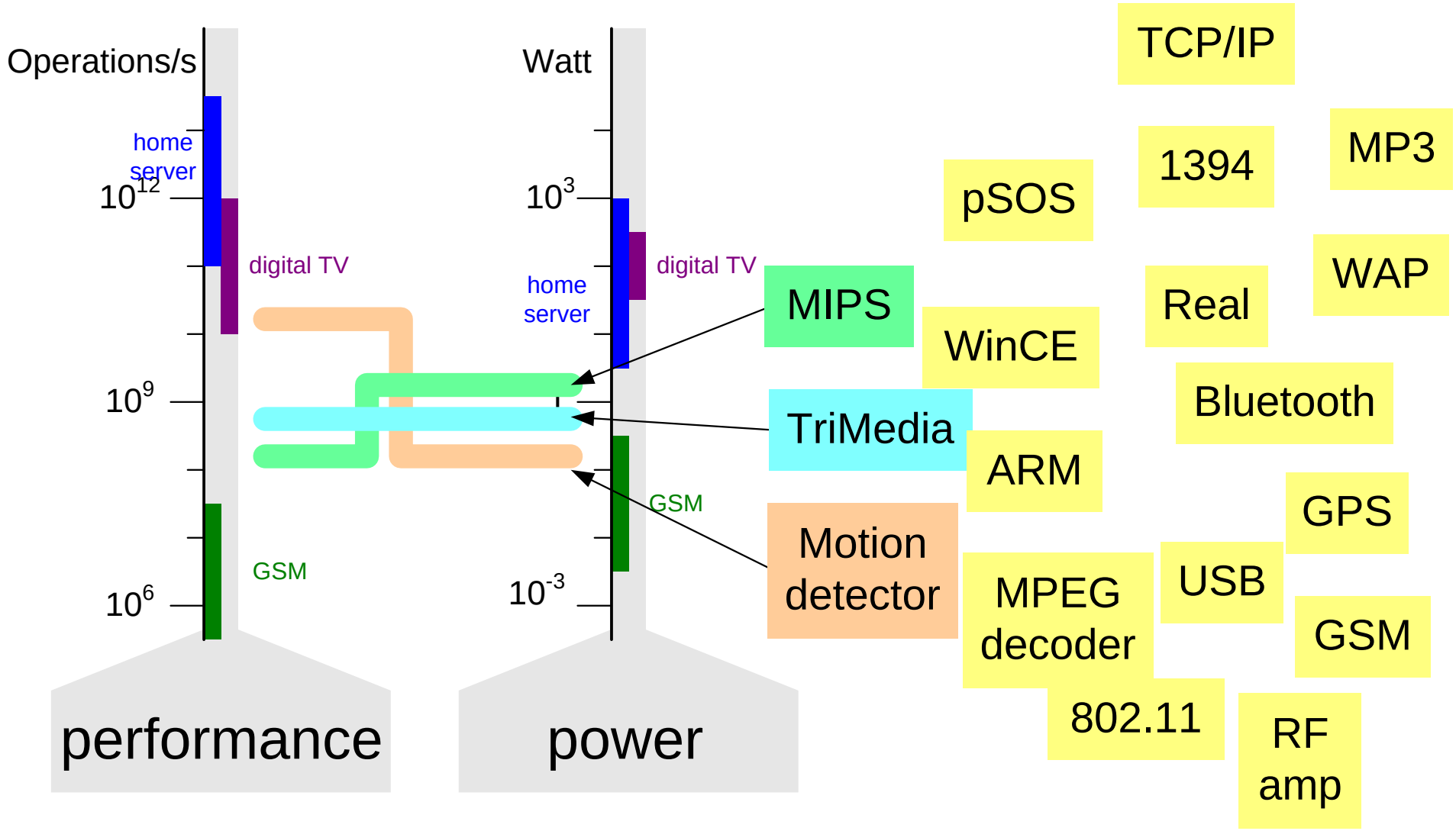
System Integrator Problem Space - Technology



System profile



PS Technology solutions



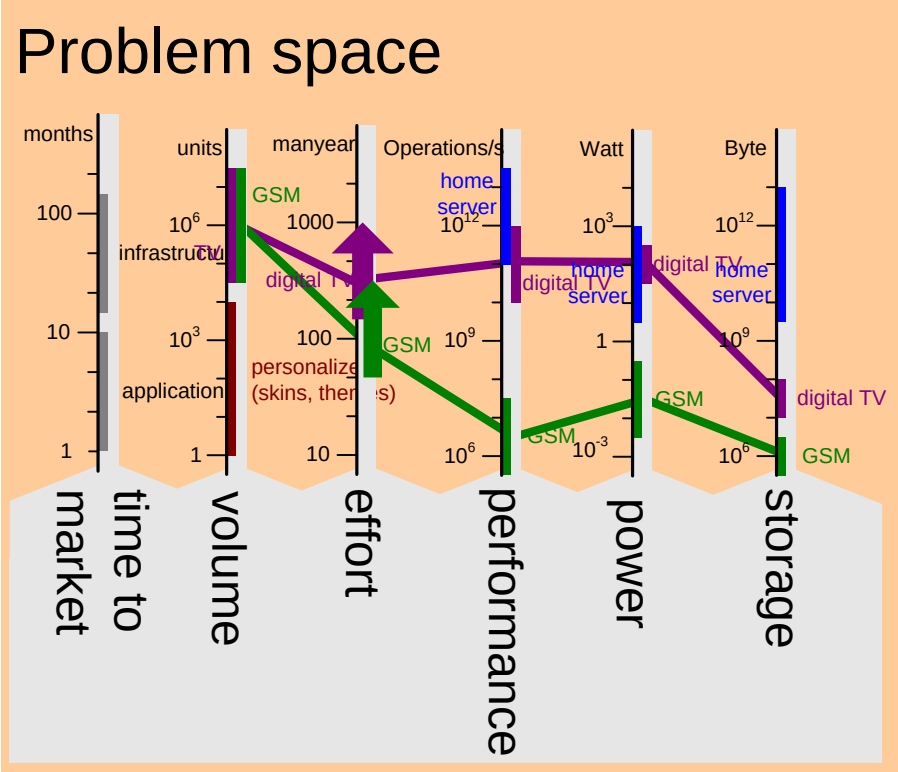
Partial Solution: Configurable Component Platform

Systems \ Technologies	MIPS	TriMedia	MPEG decoder	ARM	Real	GSM	RF amp	Bluetooth	TCP/IP	MP3	pSOS	WinCE	1394	GPS
watch				●	○	○	○	●	○	○	●	○		○
communicator	○	○	○	●	●	●	●	○	●	○	●	○		○
digital TV	●	●	●					○	○	○	●	○	●	
set top box	●	●	●					○	●	○	●	○	●	
pda	○	○	○	●	○	○	○	○	●	○		●		○
camcorder	●	●	●			○	○	○	○	○	●		●	○

● required

○ optional

Exploring problem space and solution ingredients



Systems \ Technologies	MIPS	TriMedia	MPEG decoder	ARM	Real	GSM	RF amp	Bluetooth	TCP/IP	MP3	pSOS	WinCE	1394	GPS
watch				●	○	○	○	●	○	○	●	○		○
communicator	○	○	○	●	●	●	●	○	●	○	●	○		○
digital TV	●	●	●					○	○	○	●	○	●	
set top box	●	●	●					○	●	○	●	○	●	
pda	○	○	○	●	○	○	○	○	●	○		●		○
camcorder	●	●	●			○	○	○	○	○	●		●	○

● required
○ optional

Composable Architecture

Family of products

Programmability, flexibility

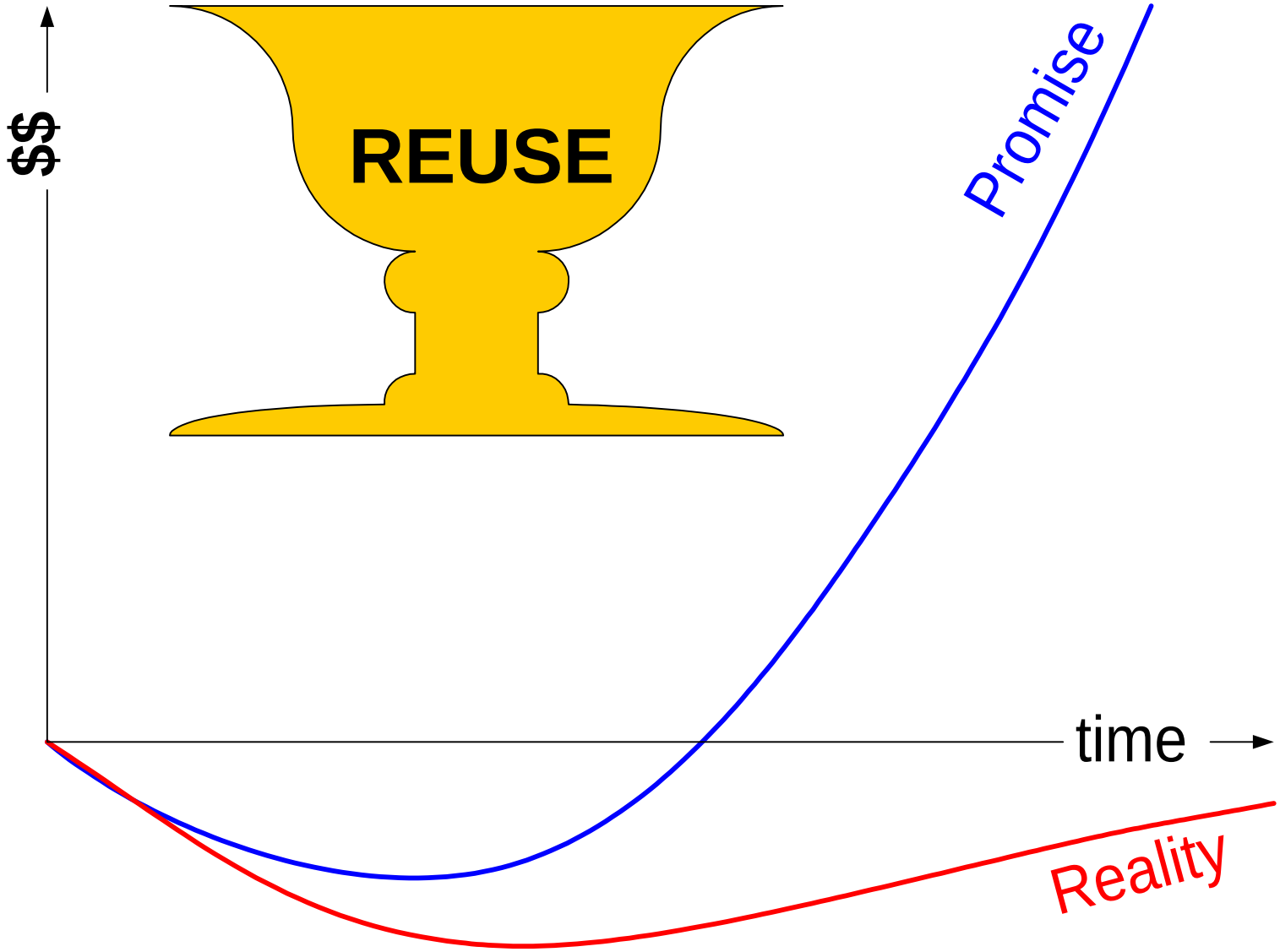
Increase supplier content

Competitive Performance / cost / power

Solution ingredients

Configurability

The Holy Grail: Reuse

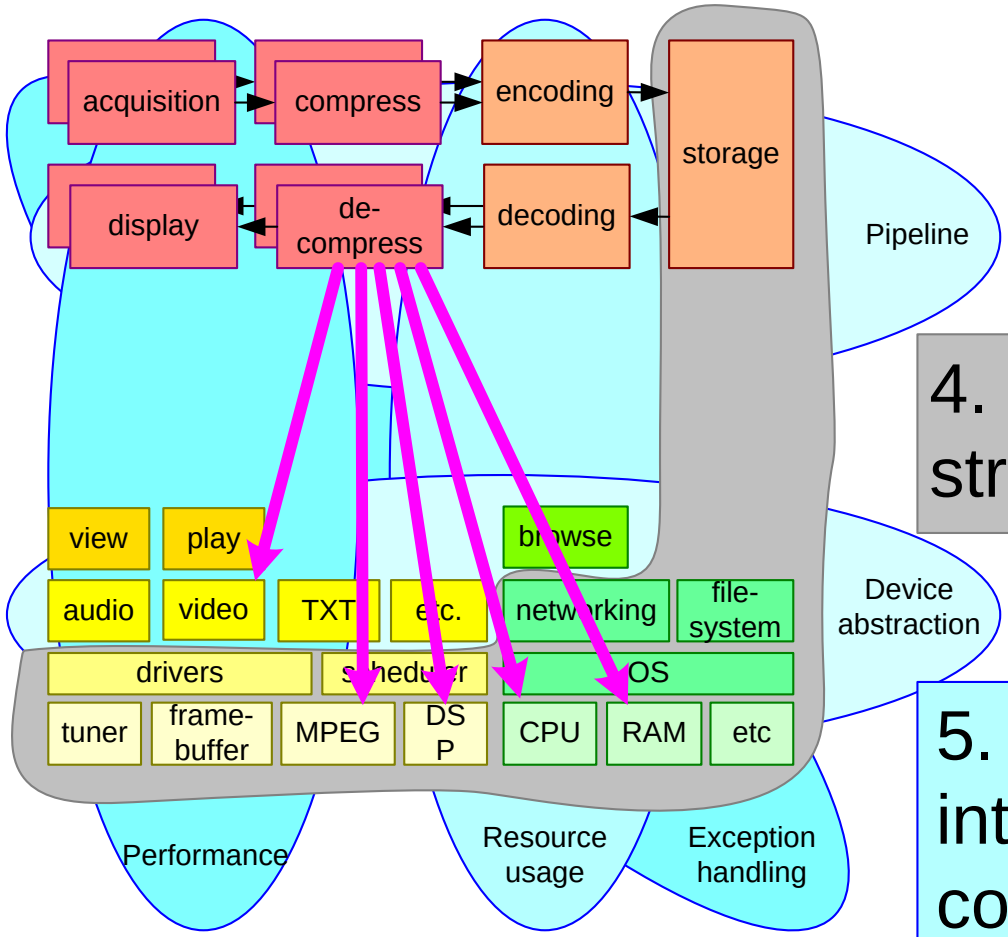


”Guiding How” by providing rules for:

1. Functional Decomposition

3. Allocation

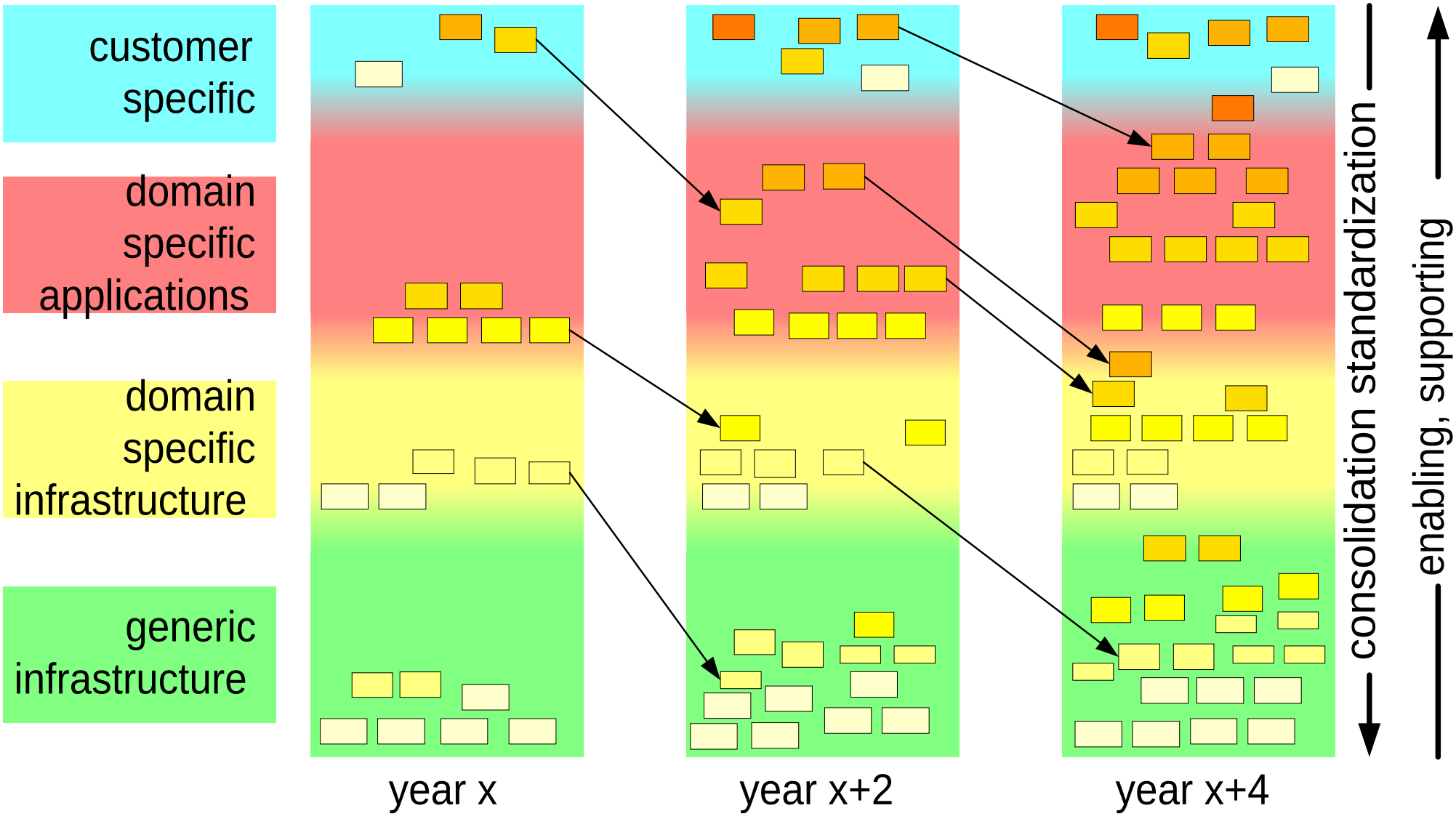
2. Construction Decomposition



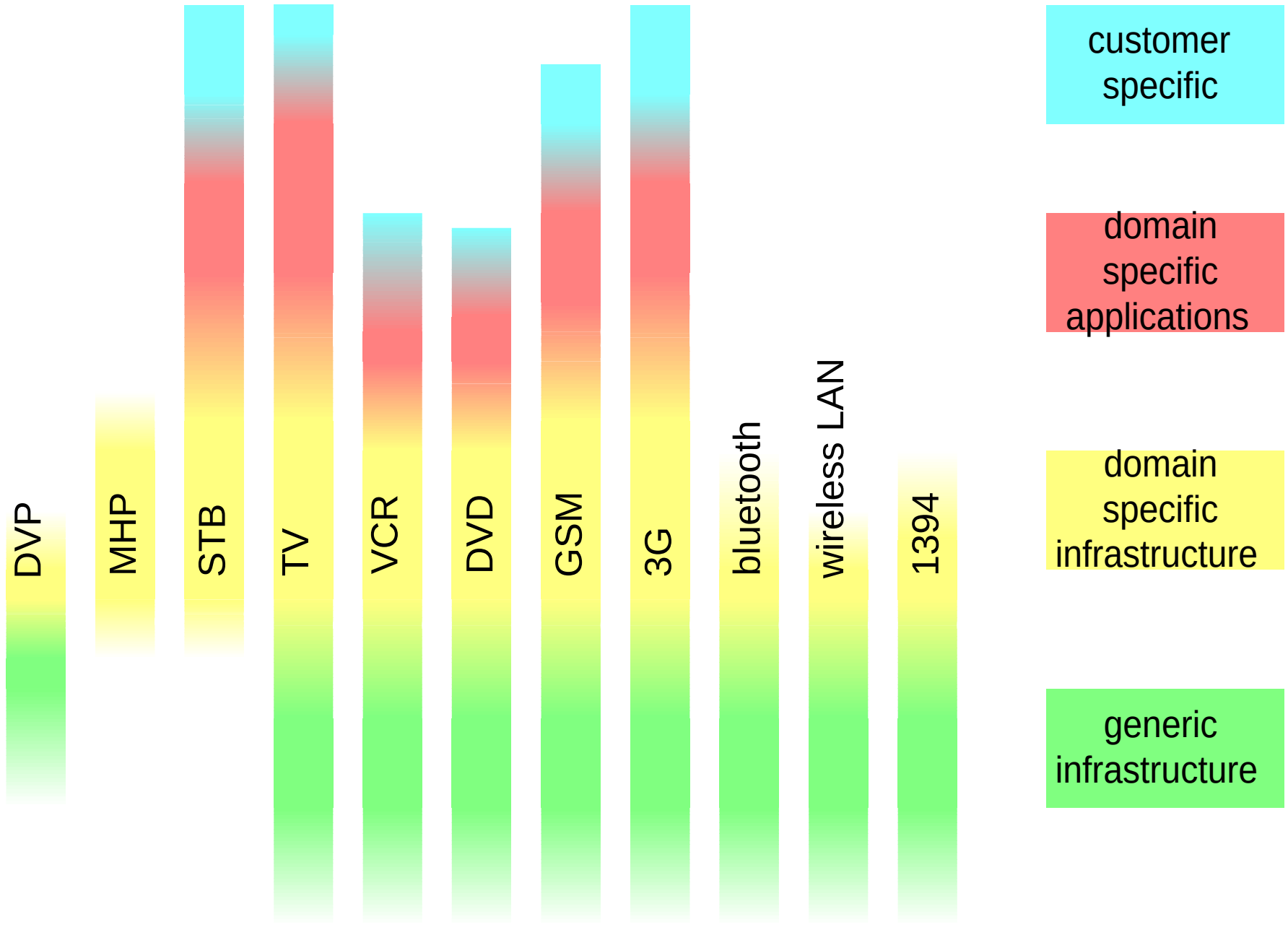
4. Infra-structure

5. Choice of integrating concepts

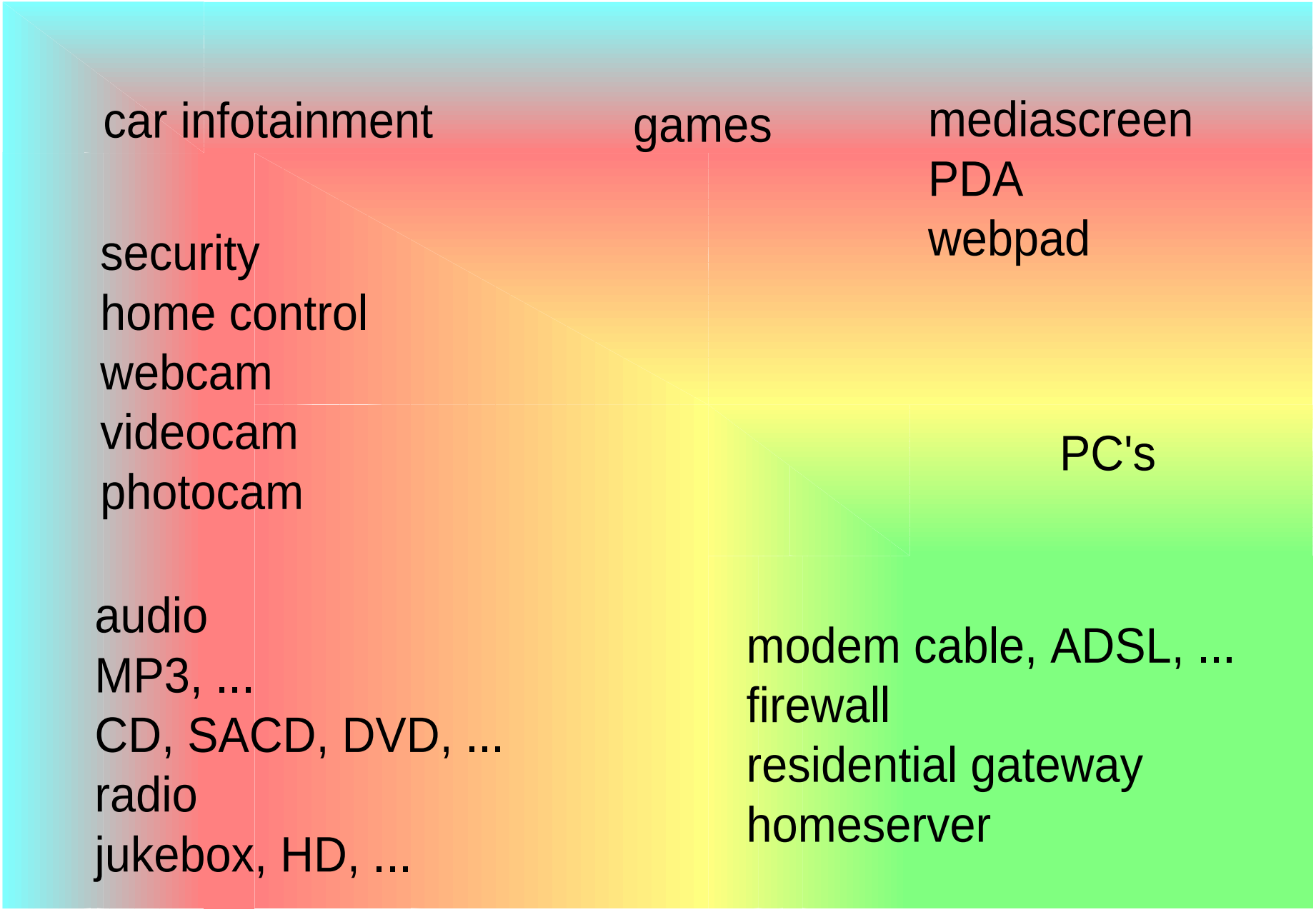
Evolution of functionality



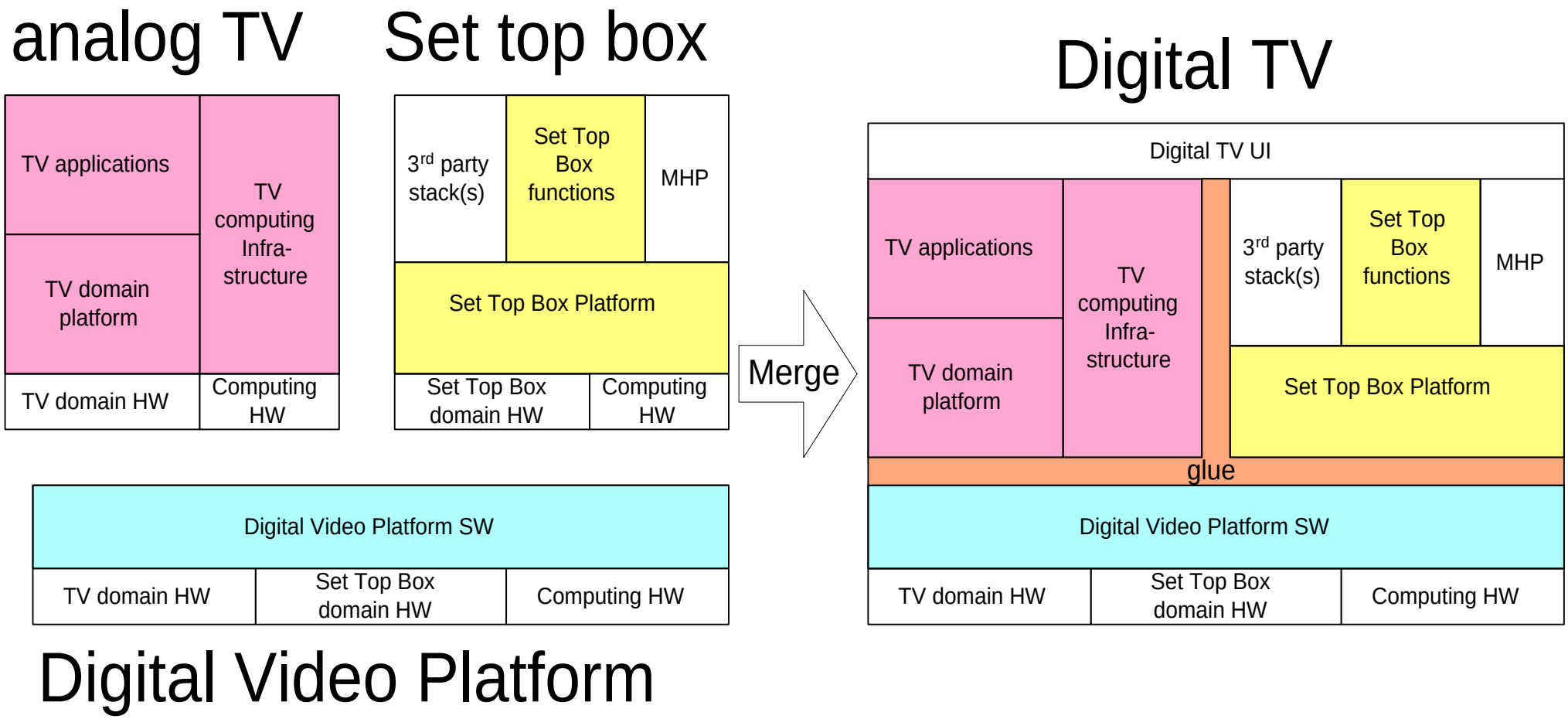
Existing SW stacks



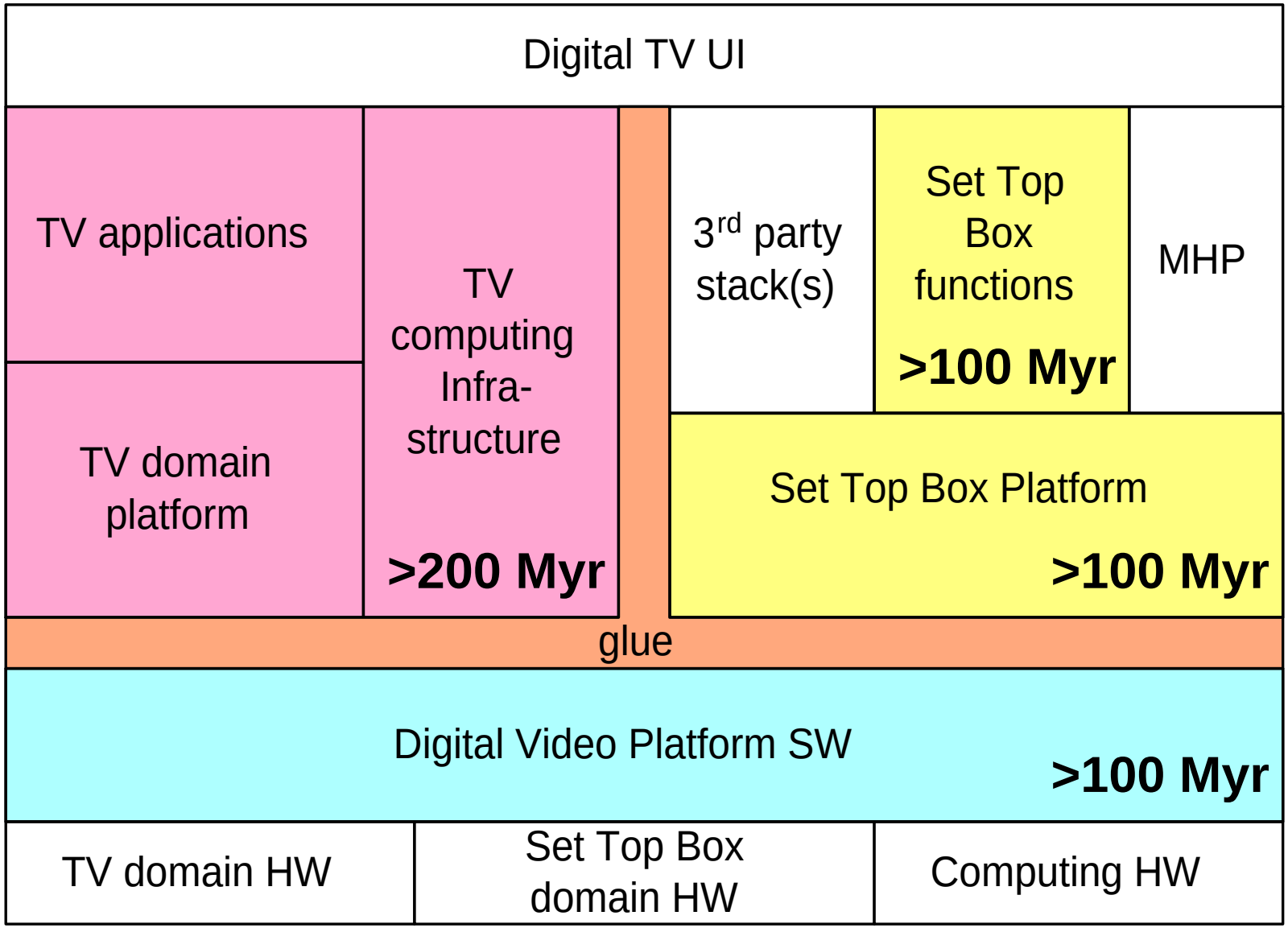
But there are much more



Simplistic Architecting: Digital TV



Available Code Assets



"Legacy" code > 500 Myr

Merge problems

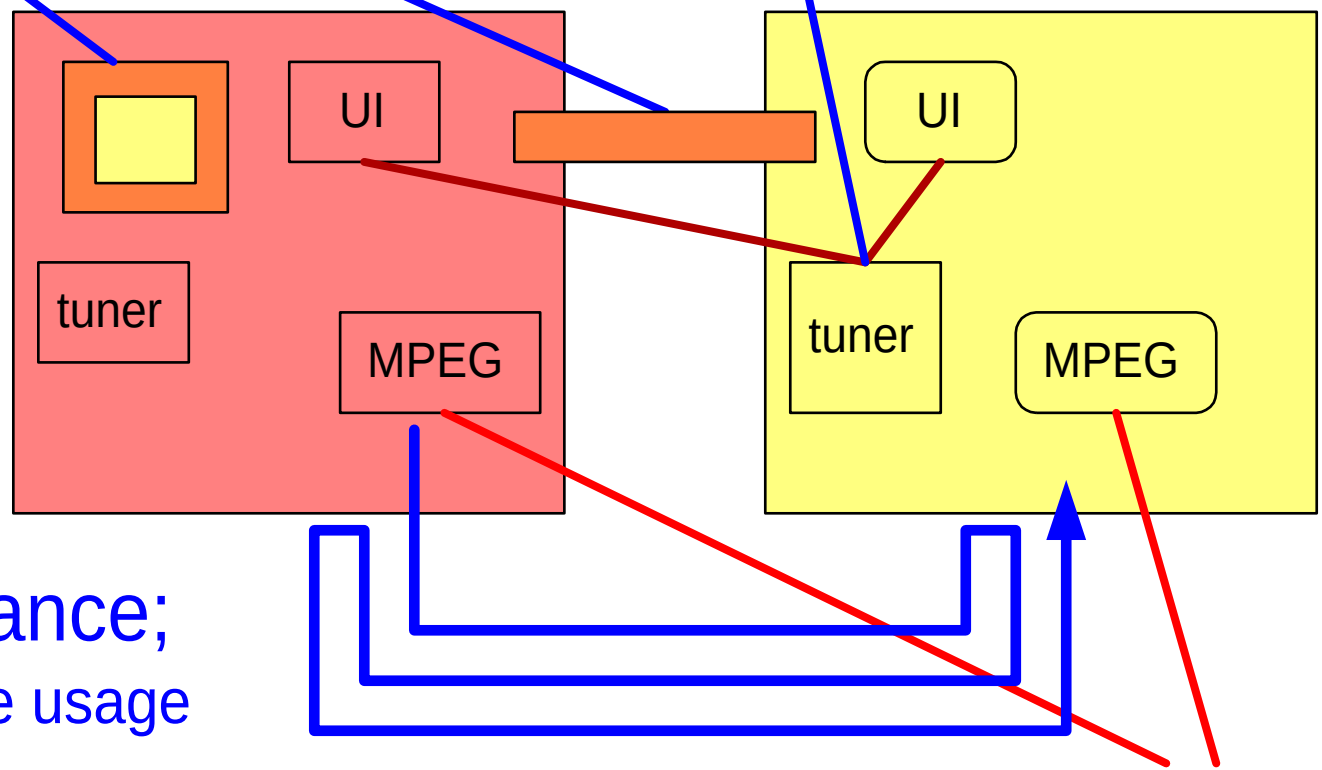
Architectural mismatch :

wrappers, translators, conflicting controls

additional code

and complexity,

no added value



Poor performance;

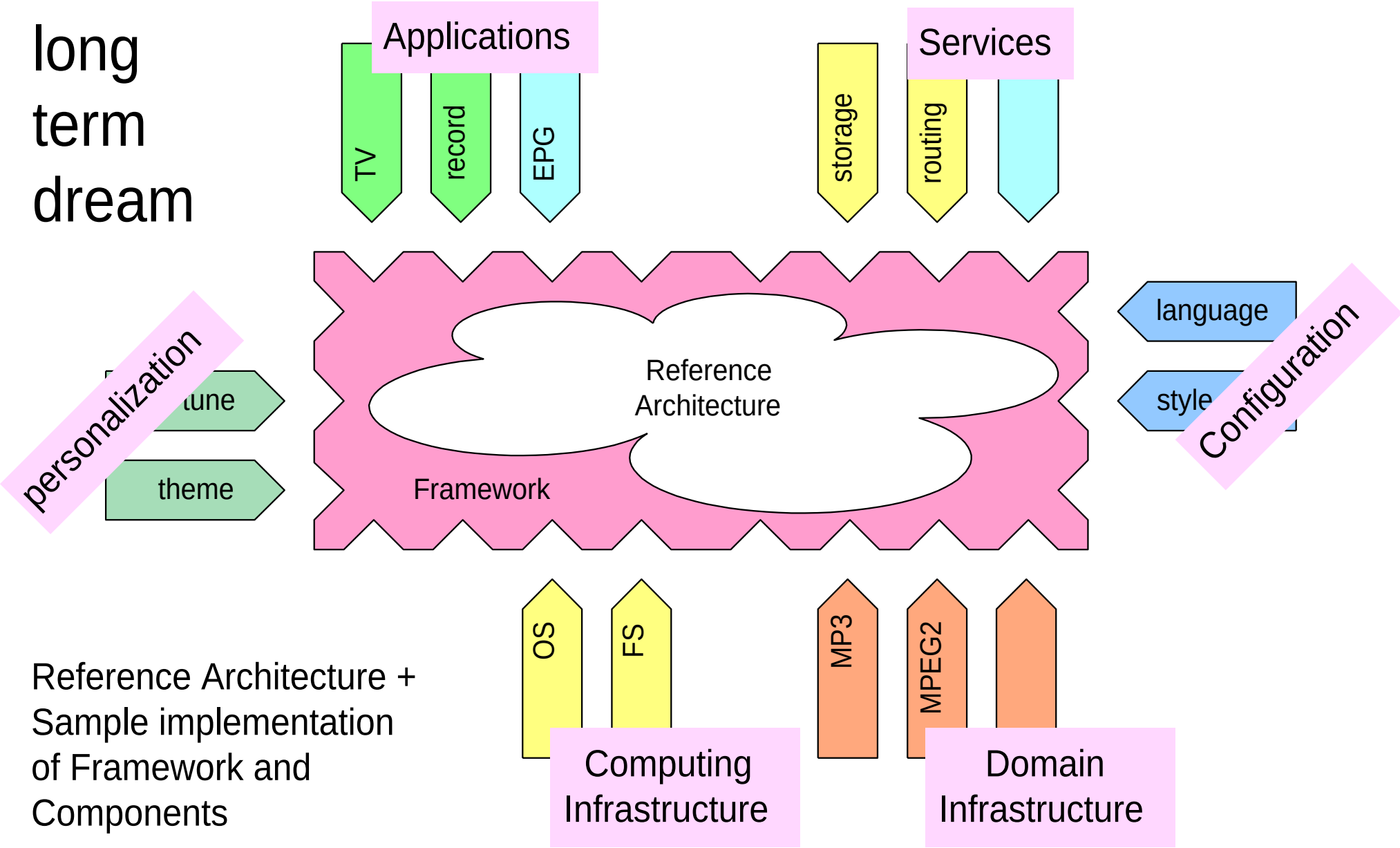
additional resource usage

Duplication

Problems ◀ Architecture — Reuse ▶ non problem

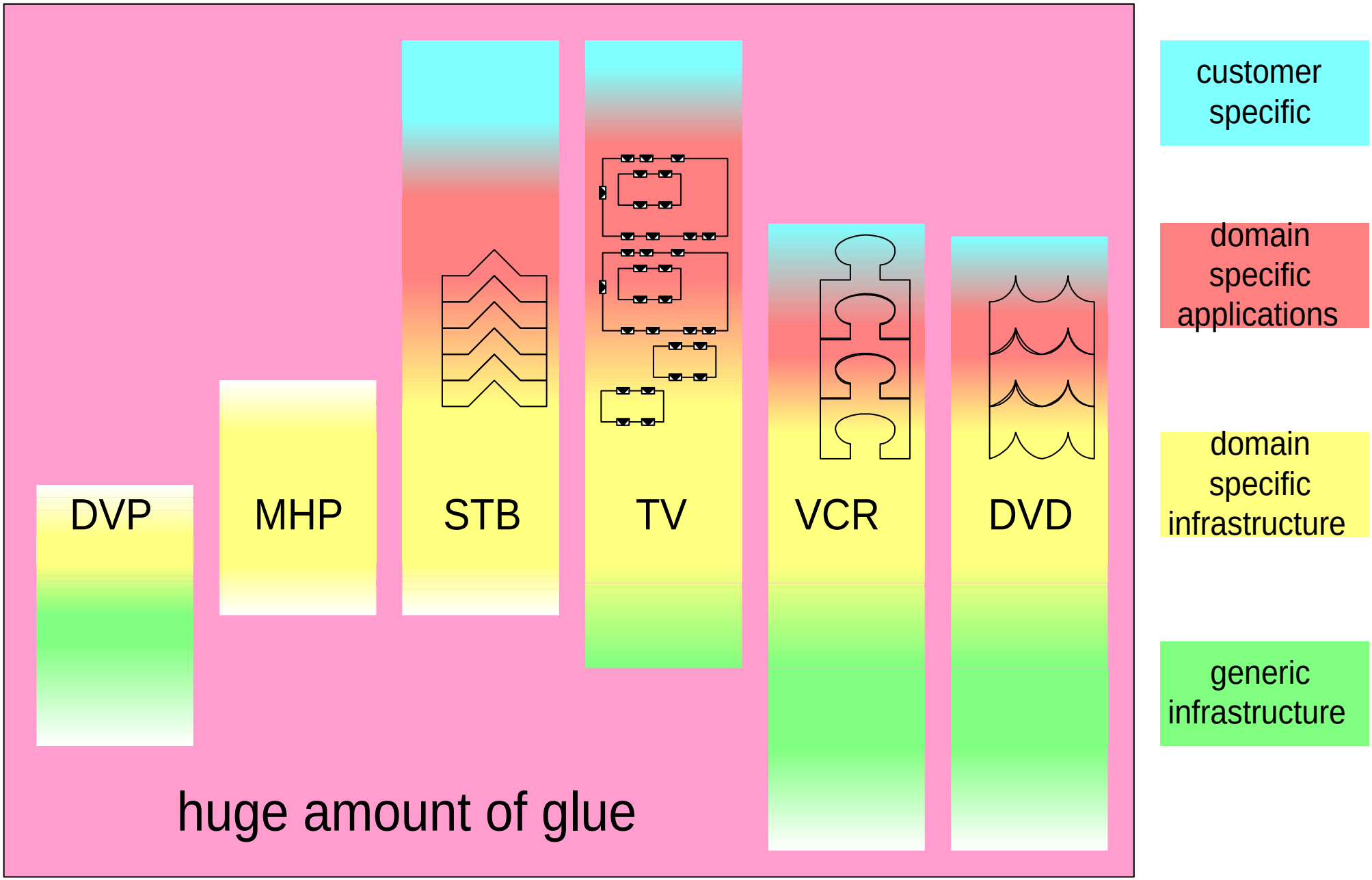
Ideal homogeneous situation?

long
term
dream

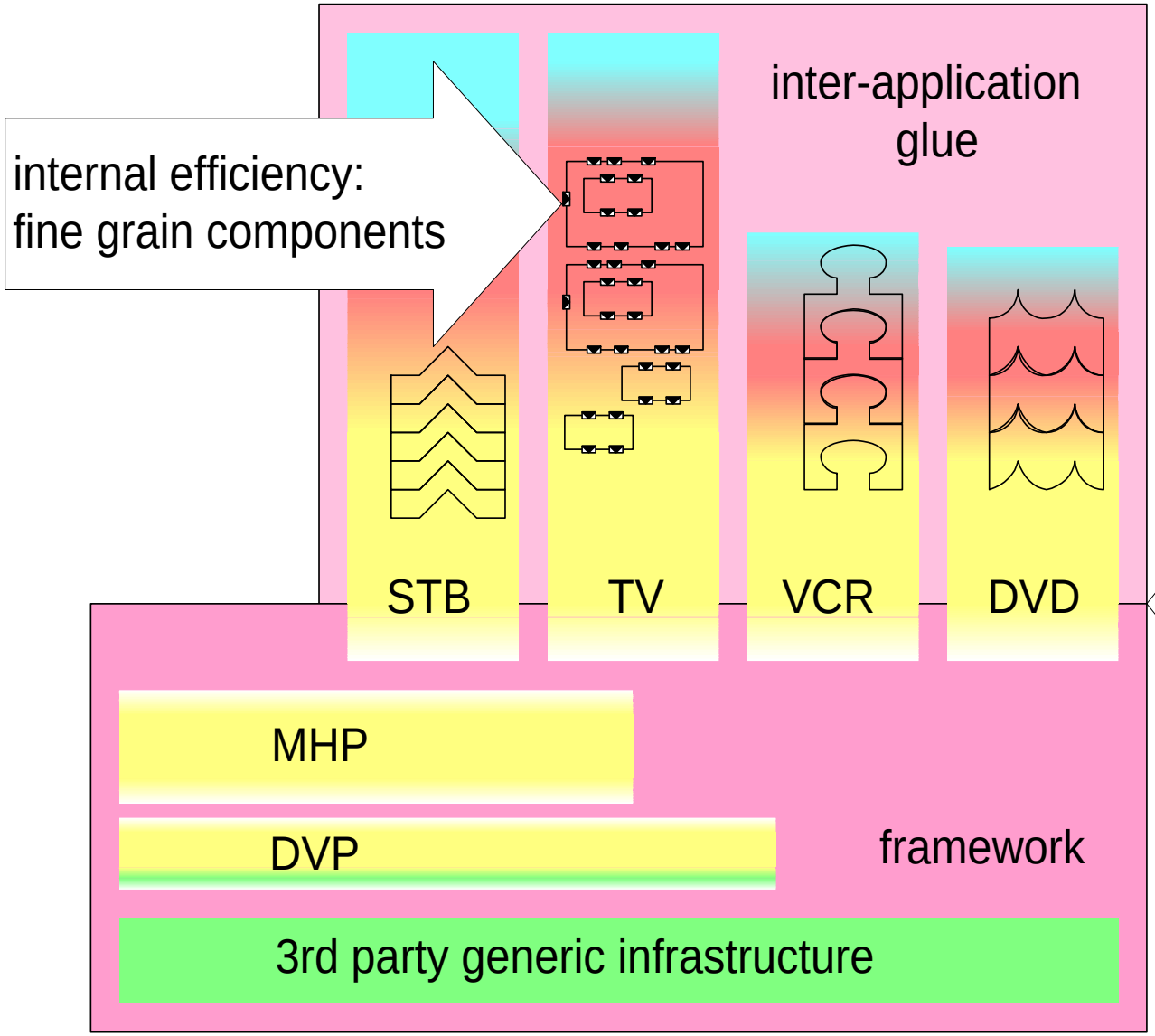


Reference Architecture +
Sample implementation
of Framework and
Components

Today's reality?



Achievable solution?



Enable
components "in the large"
nuggets

framework specialization
guidelines for integrating concept
reference decomposition/allocation
interface, format, protocol standards
prototyping, development environments

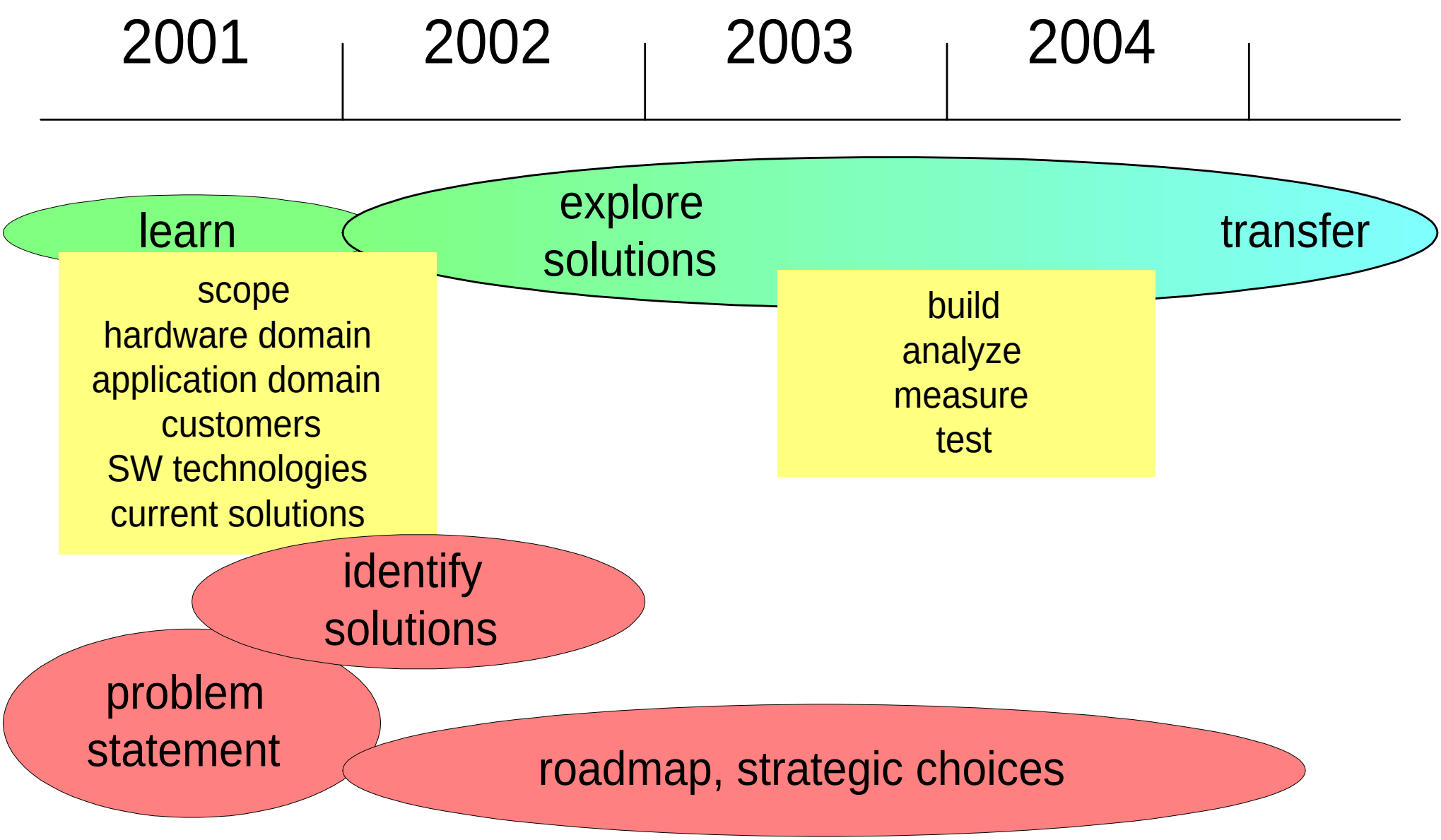
Software productivity research goals

to define / vary / **create** / integrate / test / maintain products **faster** with **less effort**

and/or

to achieve better / faster / more functional / more reliable / safer / ... products

by means of

methods
tools
integration technology
component technology
... SW technology
standardization
partnering strategy
?

Coarse research plan