Light Weight Architecture: the way of the future?

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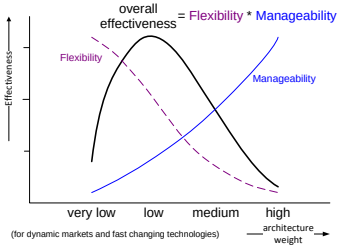
Abstract

The question : ”What is an architecture” is addressed. Trends in the customer world and in the technology are used to obtain an outline of the product requirements. The customer world itself is a value chain consisting of quite heterogeneous stakeholders.
To satisfy the needs of these customers an integral approach is required. Architectures play a key role in such an integral approach.
Architecture lessons from practice are given to illustrate criteria for a good architecture are discussed. The concept of architecture-weight is introduced.



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What is Architecture?

Do the right things

Do the things right

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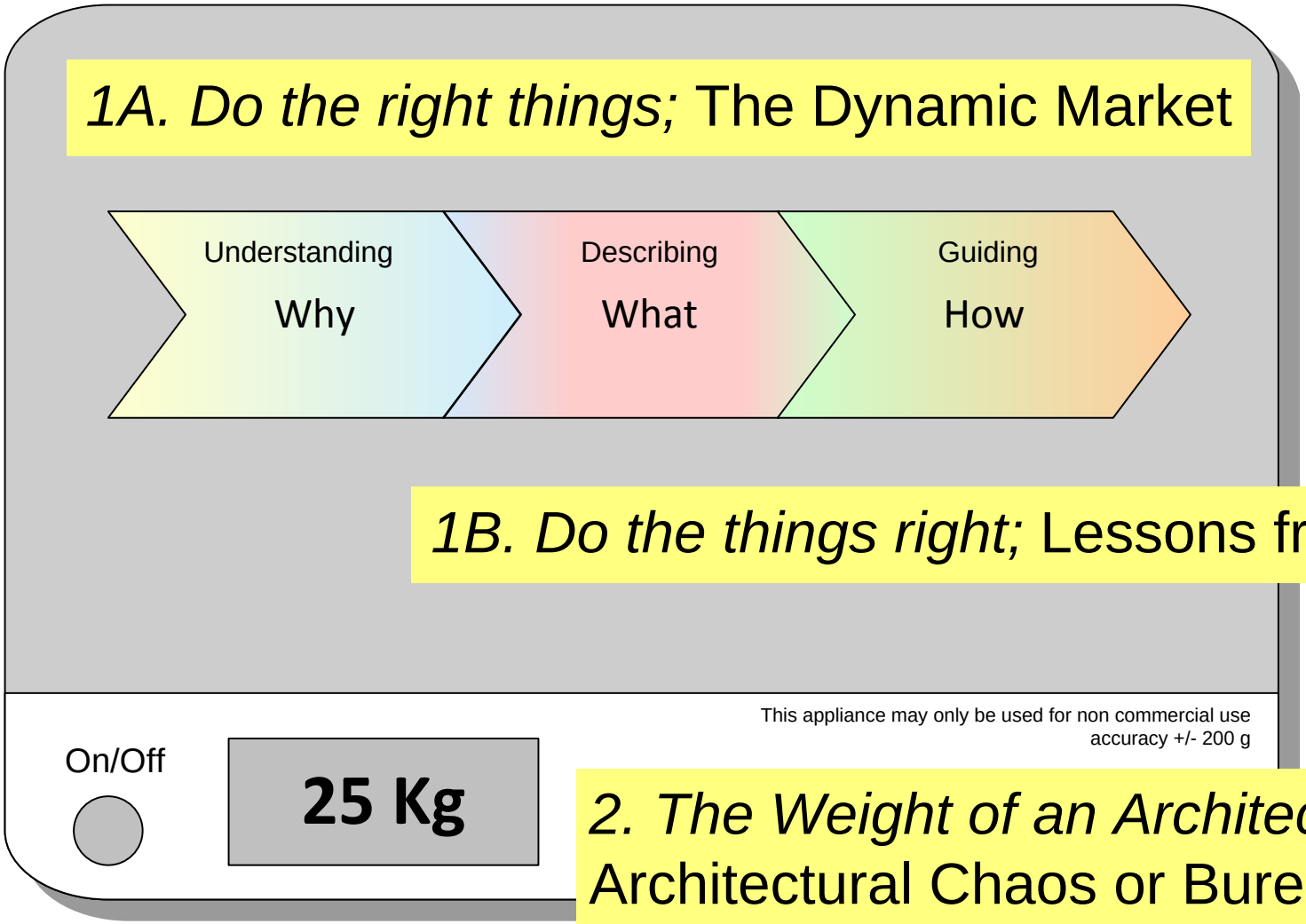
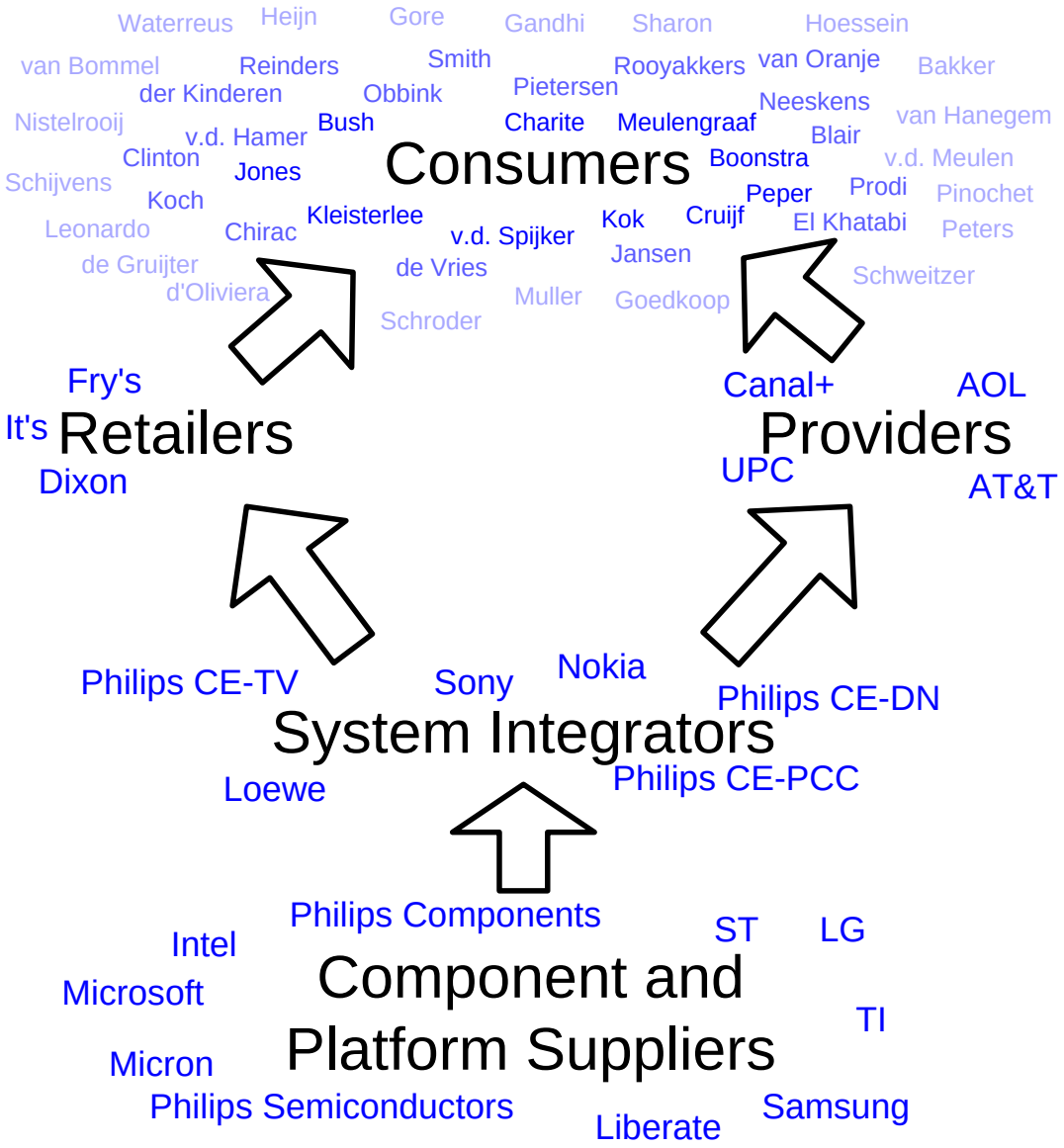


Part 1A:
Do the right things;
The Dynamic Market

Value chain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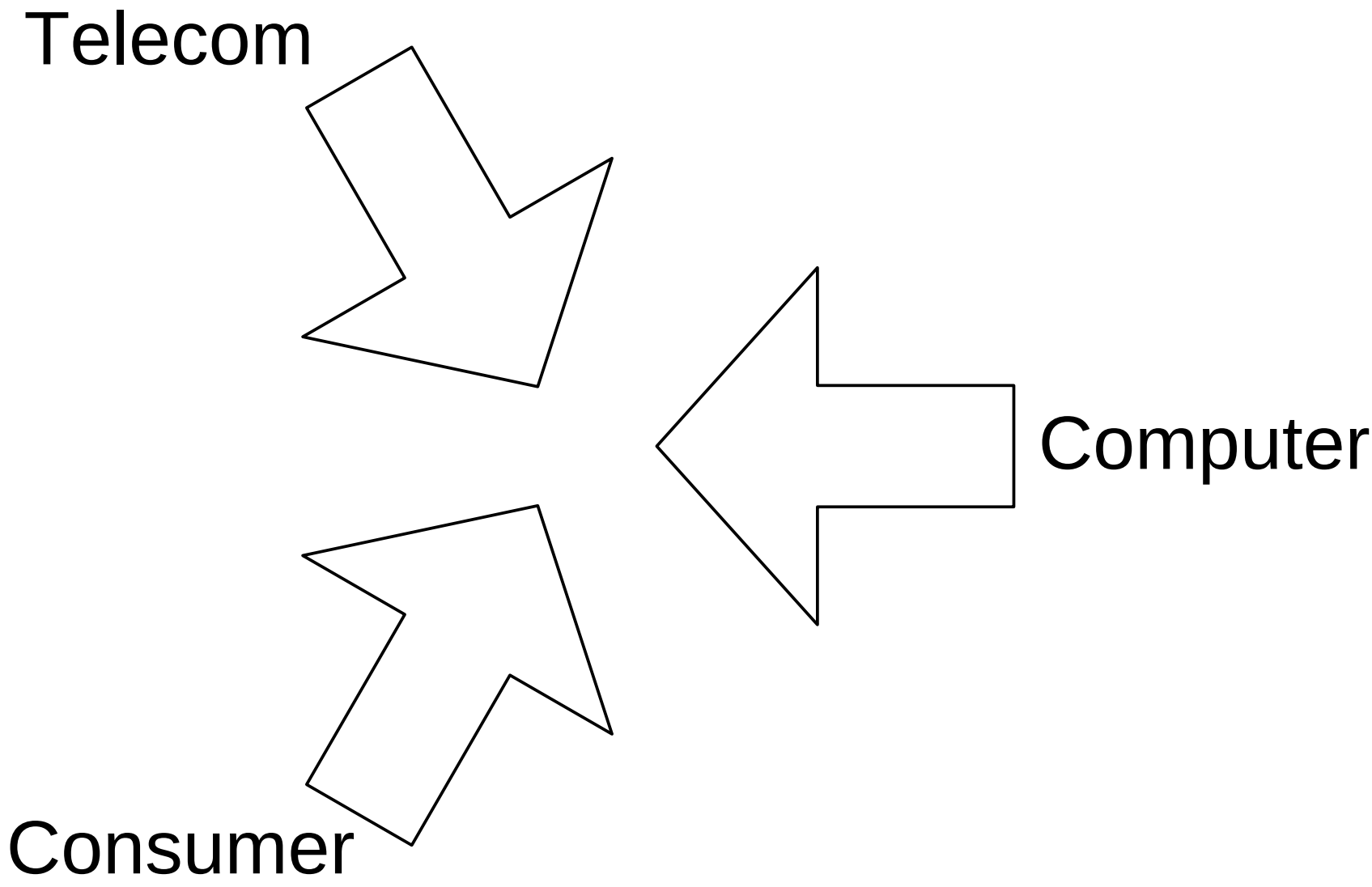
van Oranje
Bakker
der Kinderen
Obbink
Pietersen
Neeskens
Nistelrooij
Bush
Charite
Meulengraaf
van Hanegem
v.d. Hamer
Blair
Clinton
Consumers
Boonstra
v.d. Meulen
Schijvens
Jones
Peper
Prodi
Pinochet
Koch
Kleisterlee
Kok
Cruijf
El Khatabi
Leonardo
Chirac
v.d. Spijker
Peters
Jansen
de Gruijter
de Vries
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
Philips Components
Intel
ST
LG
Microsoft
Component and
Platform Suppliers
TI
Micron
Philips Semiconductors
Samsung
Liberate

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

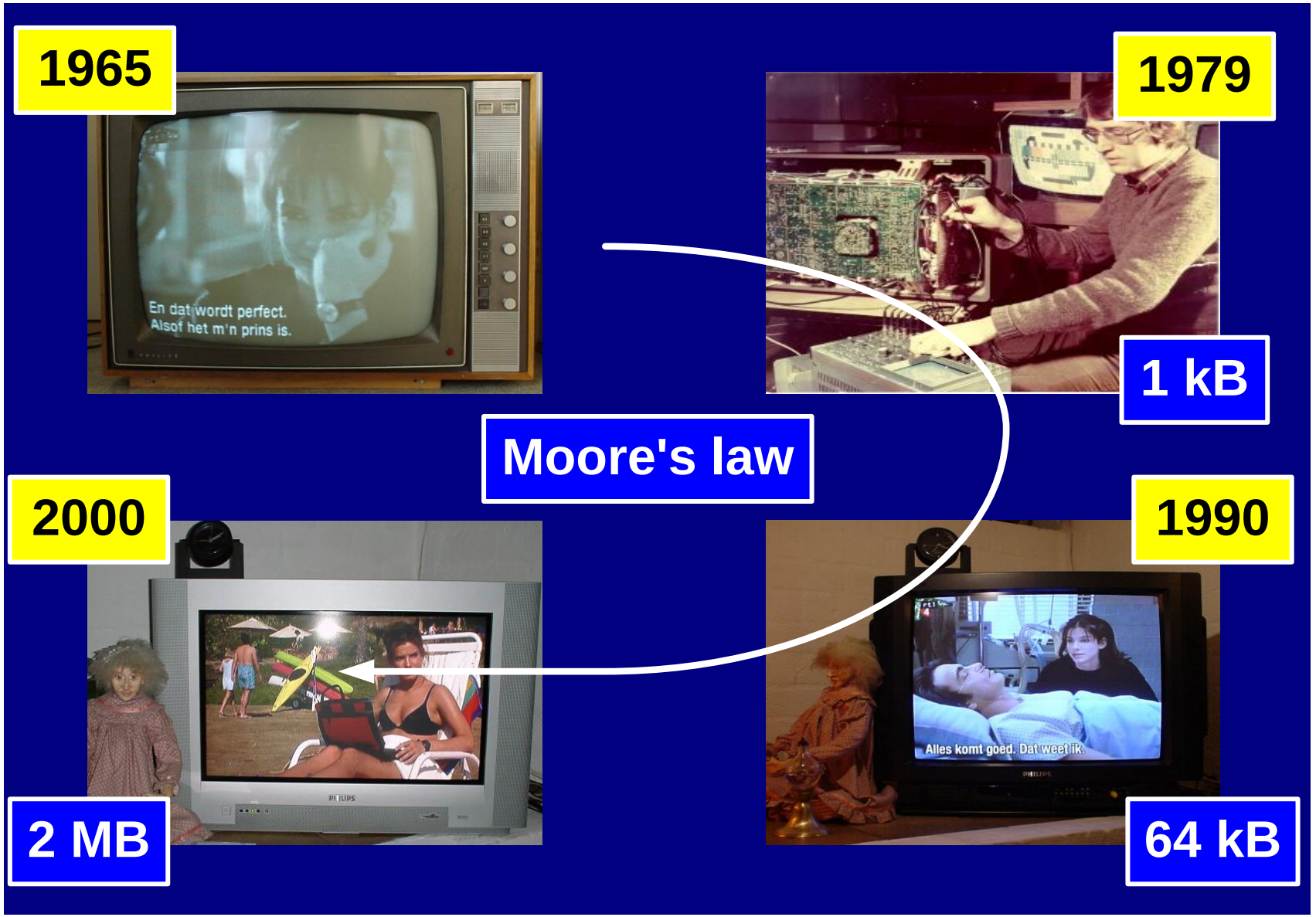

Communicator


Ambient Intelligence living room

Uncertainty (Dot.Com effect)

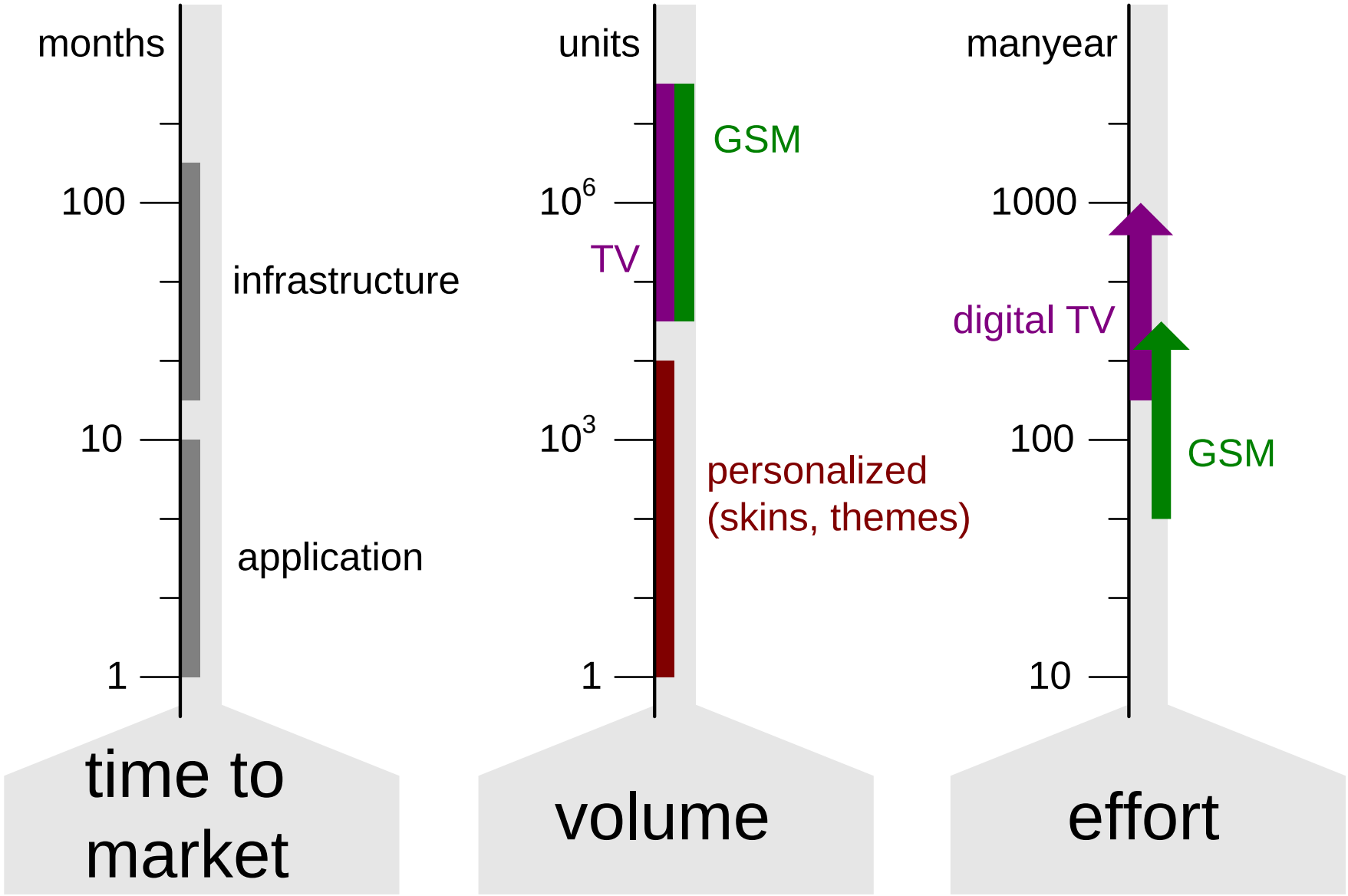
source: BigChart.com
dd march 19, 2001

Moore’s law

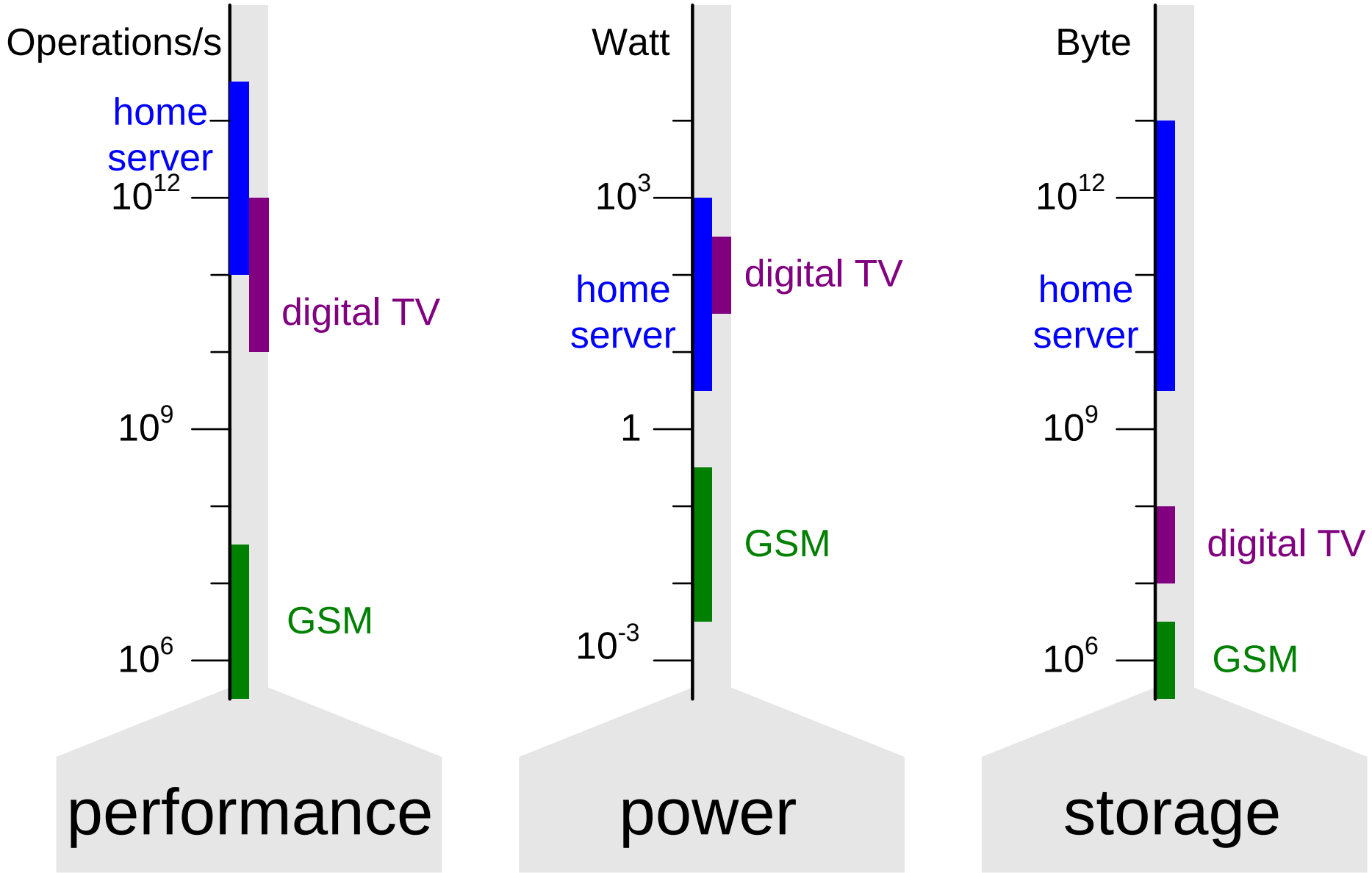


From: COPA tutorial, Rob van Ommering

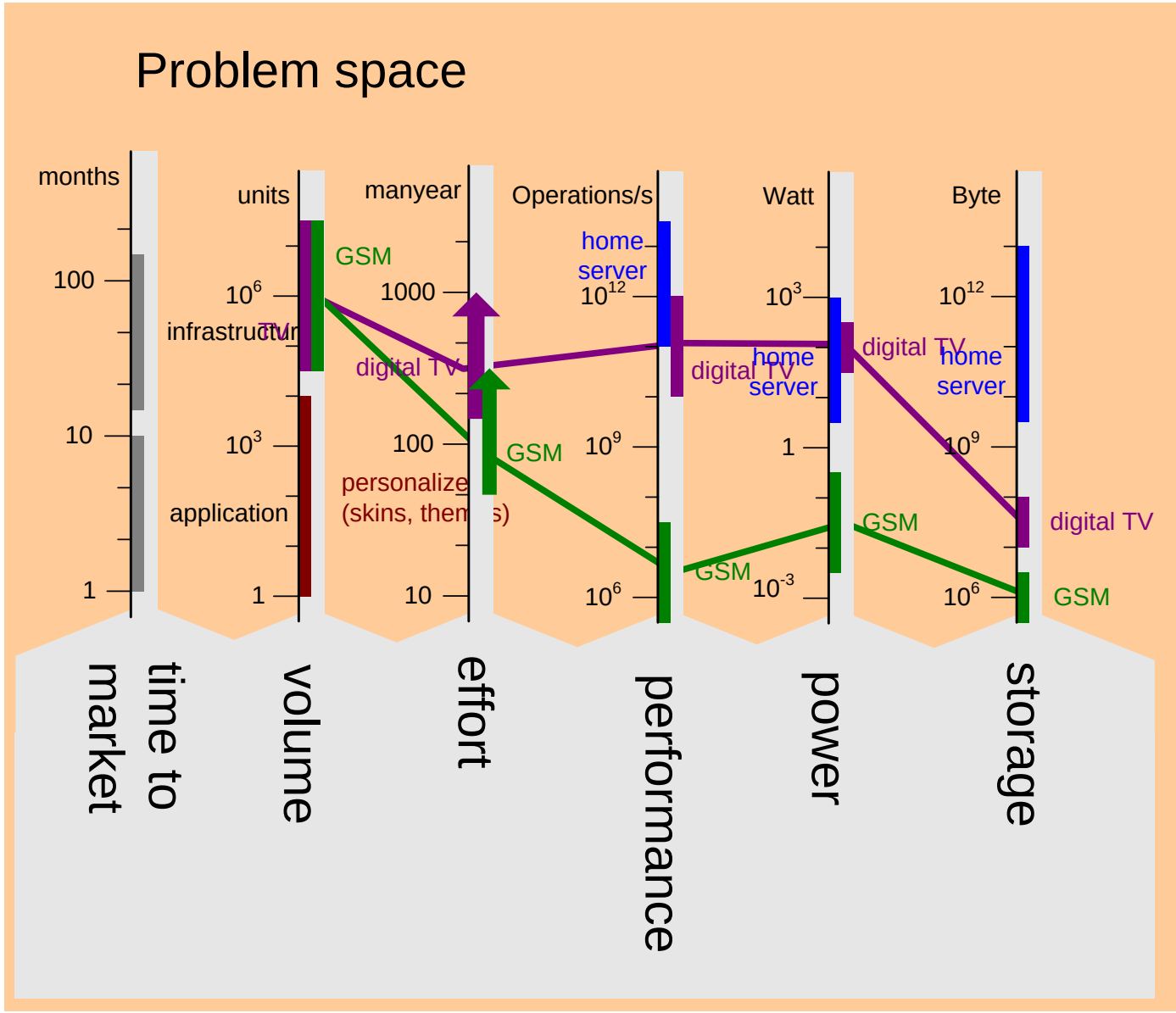
System Integrator Problem Space - Business



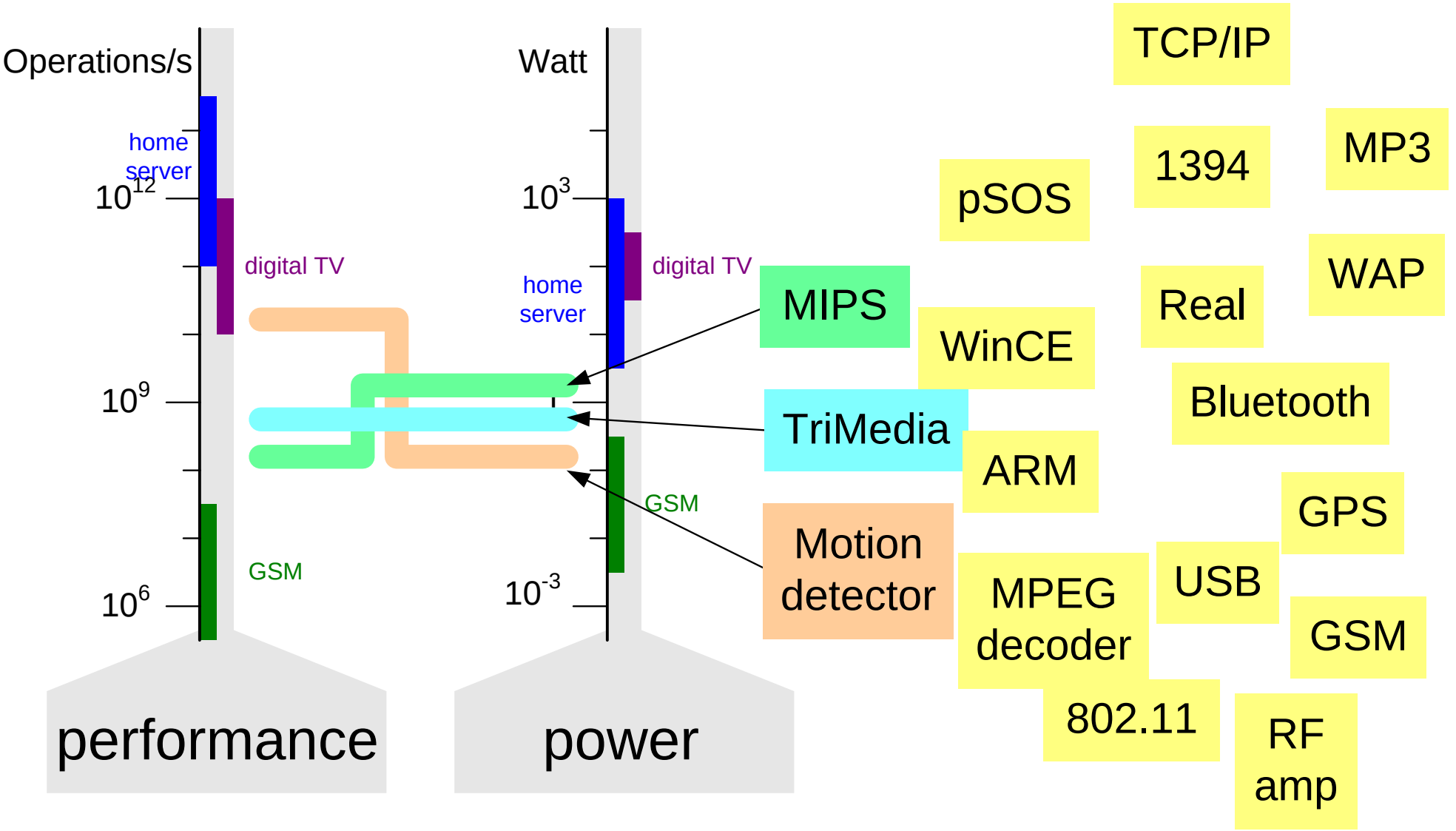
System Integrator Problem Space - Technology



System profile



PS Technology solutions



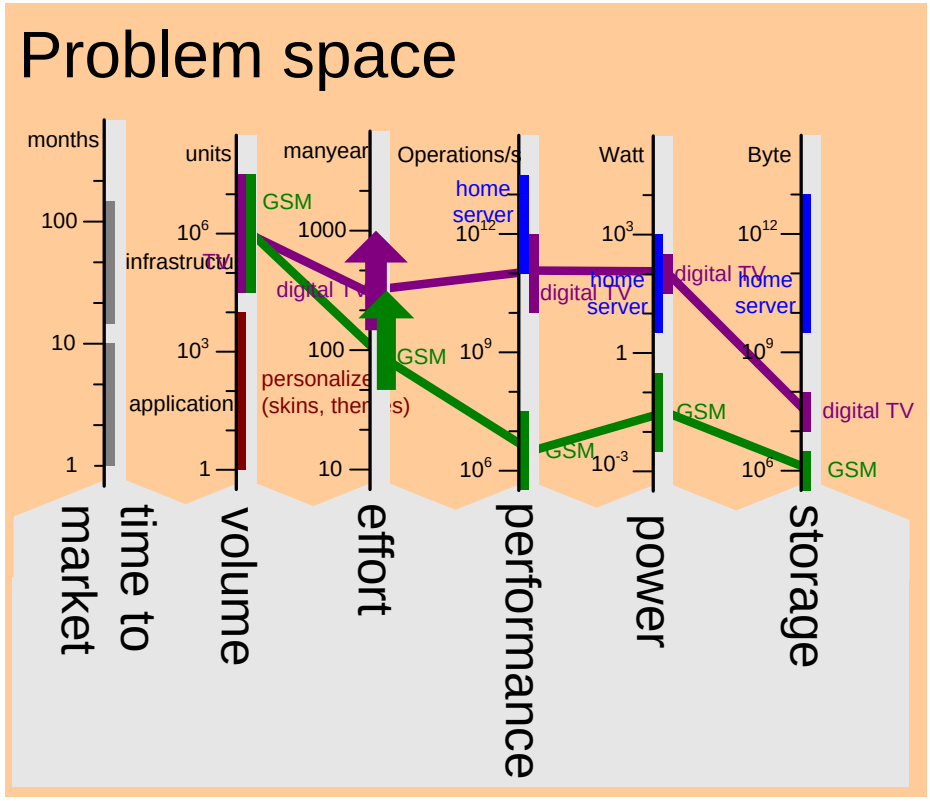
Partial Solution: Configurable Component Platform

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

Configurability

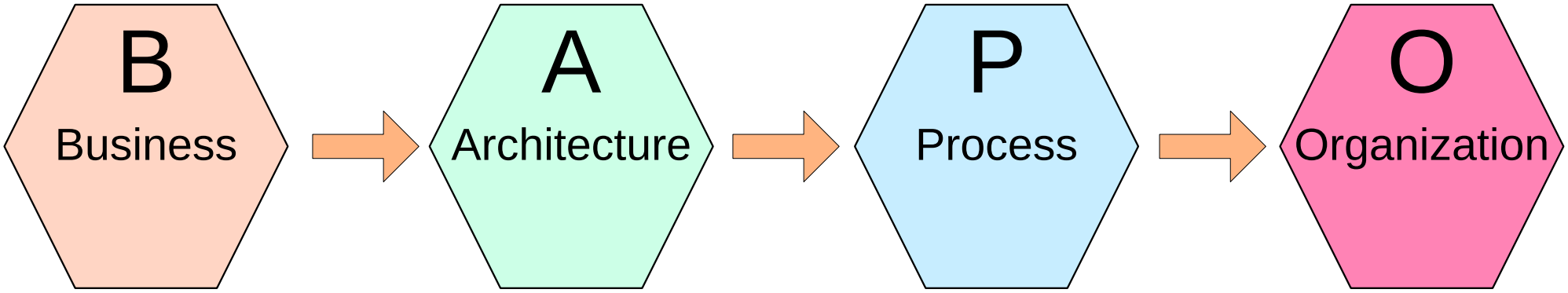
Solution ingredients

Programmability, flexibility

Increase supplier content

Competitive Performance / cost / power

More than Architecture



From: COPA tutorial;
Philips SW conference 2001.

Architecture only works if the complementary viewpoints are addressed consistently

Conclusions Part 1A

Understanding
Why

Describing
What

Dynamic Market
Convergence
Integration
Diversity

Configurable Component Platform

Portfolio and Family architecture

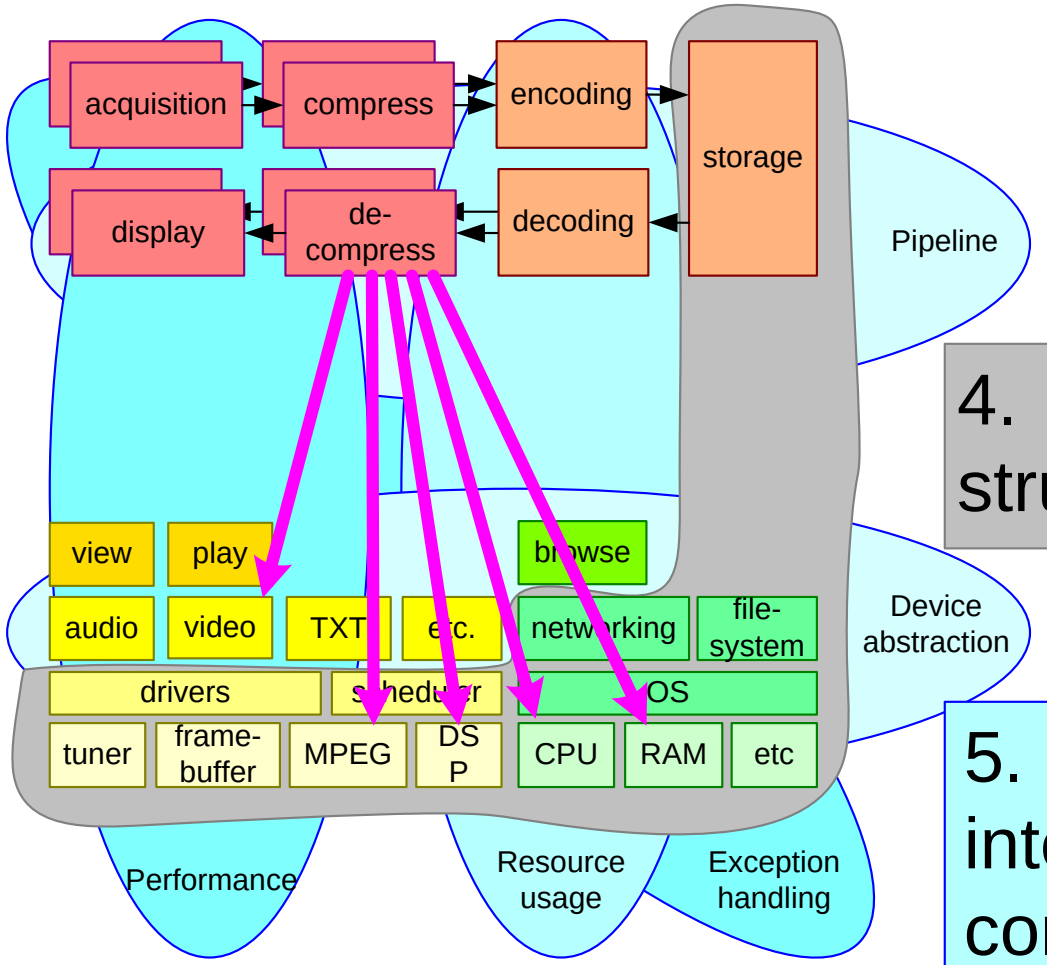
Part 1B:
Do the things right;
Lessons from Practice

”Guiding How” by providing rules for:

1. Functional Decomposition

3. Allocation

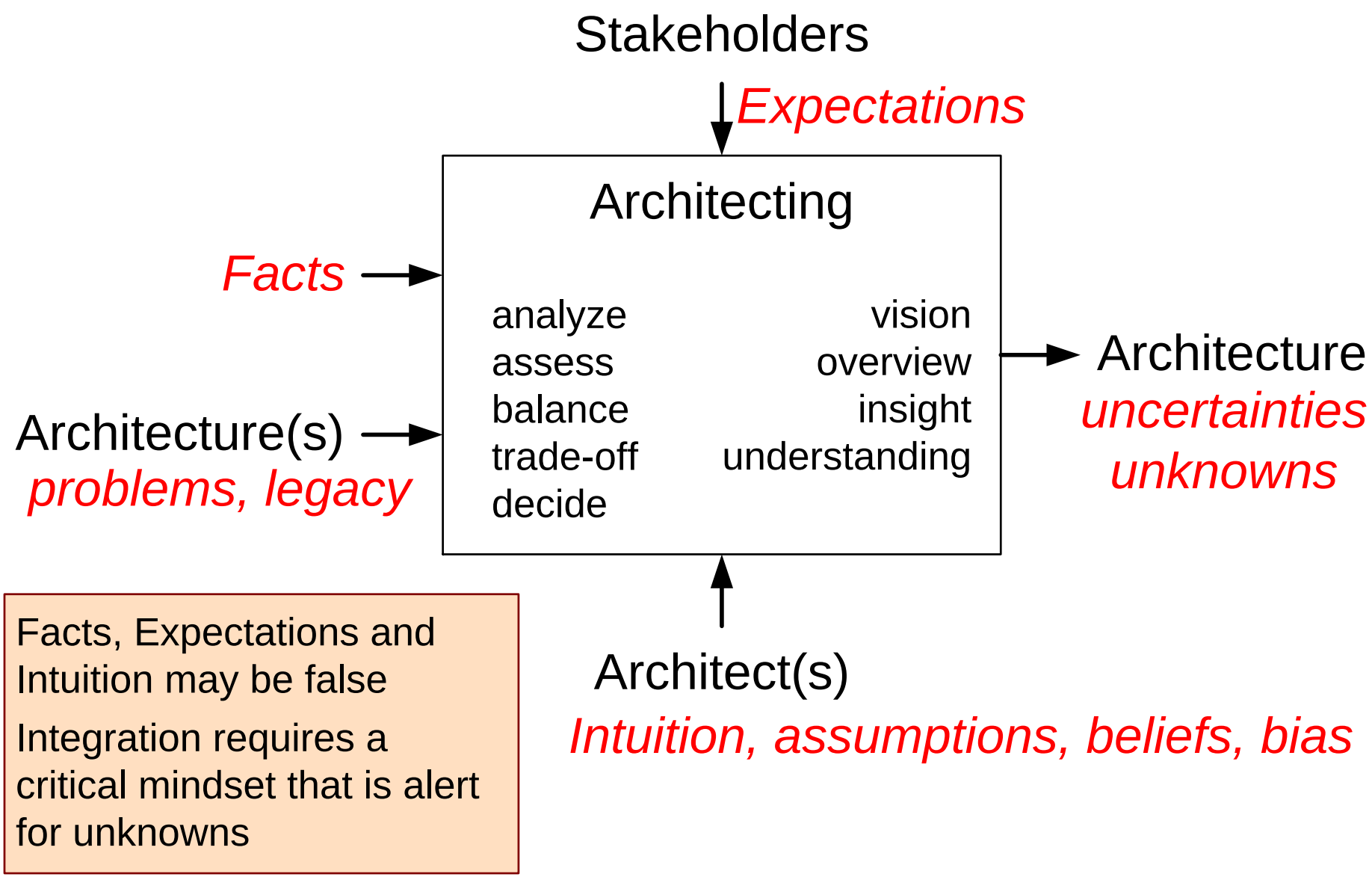
2. Construction Decomposition



4. Infra-structure

5. Choice of integrating concepts

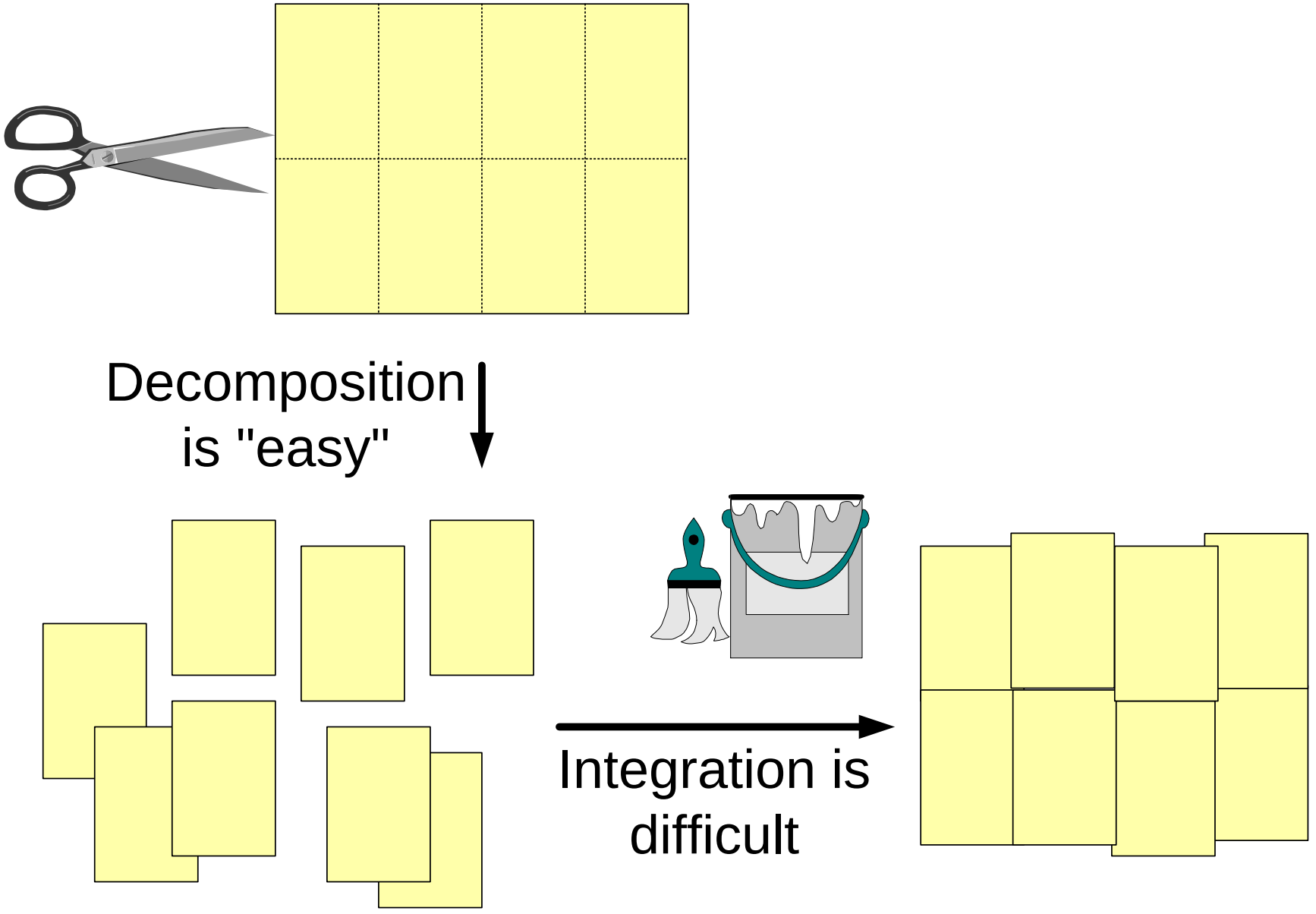
The Art of Architecting



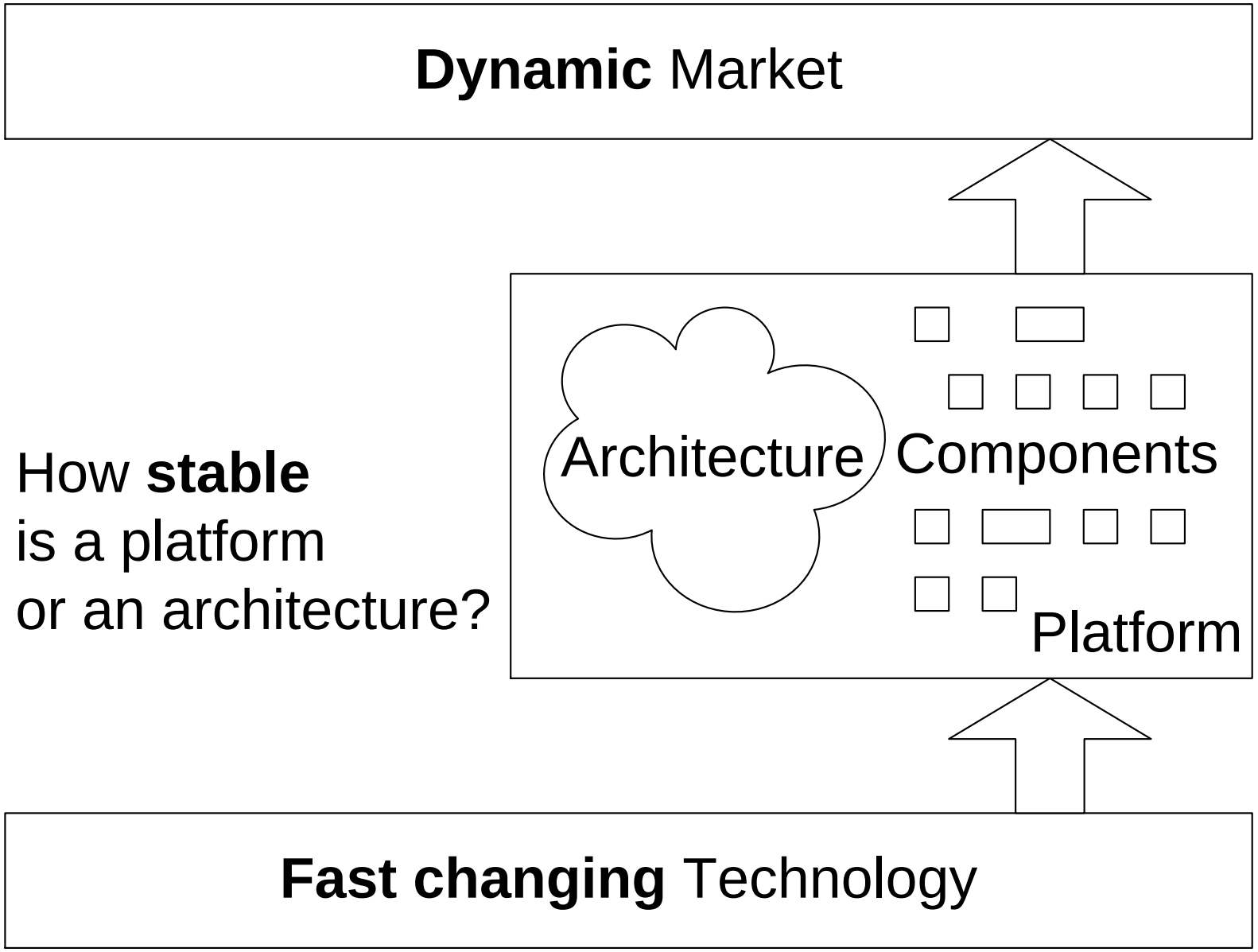
Facts, Expectations and Intuition may be false

Integration requires a critical mindset that is alert for unknowns

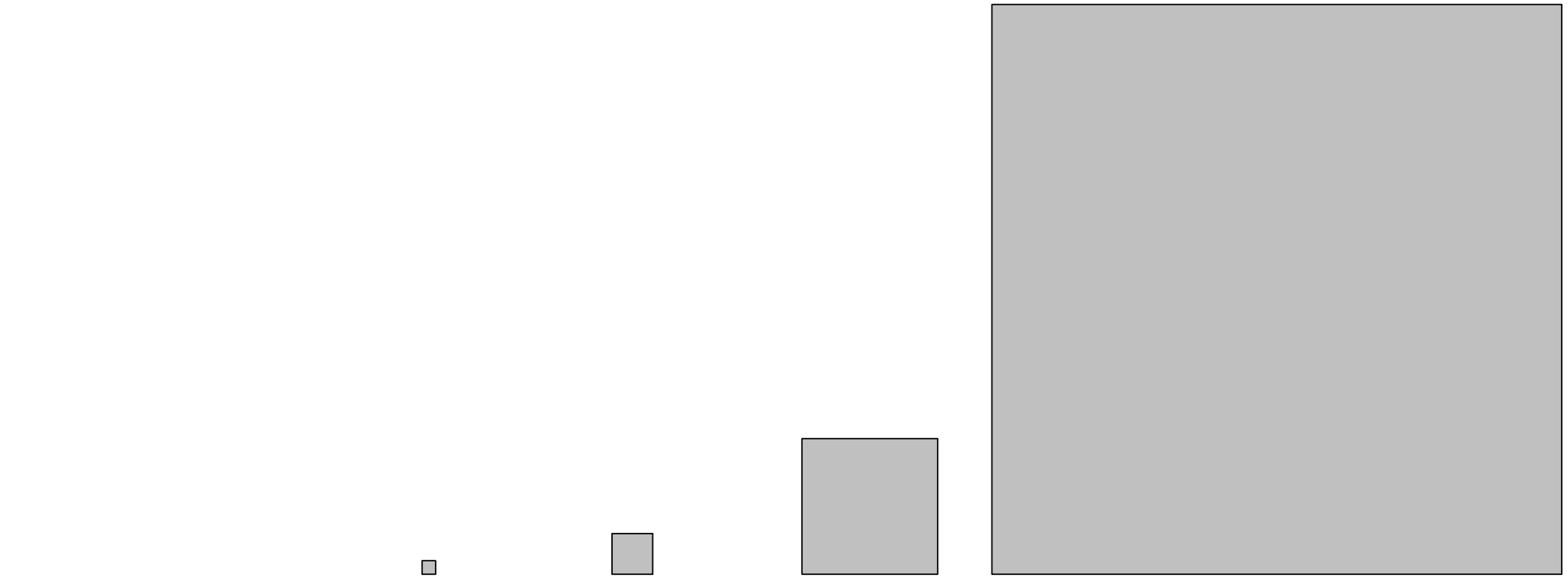
Architecting is much more than Decomposition



Myth: Platforms are Stable

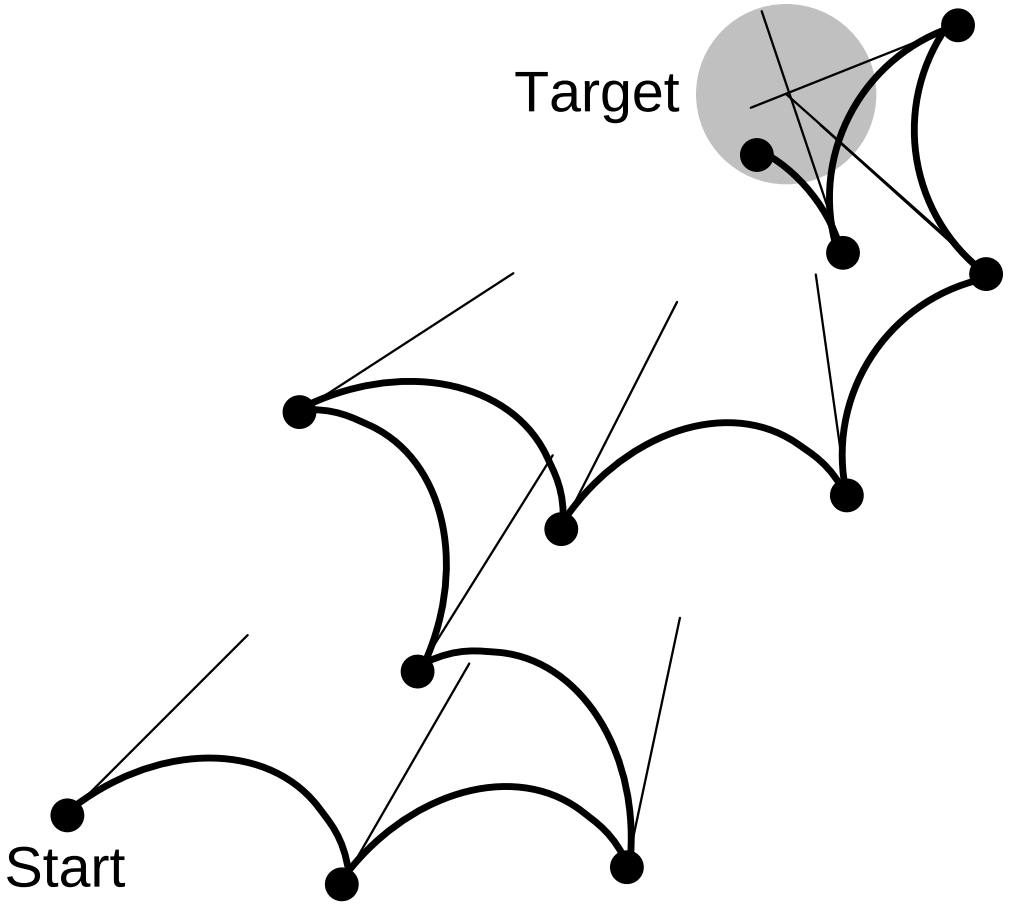


The first time right?



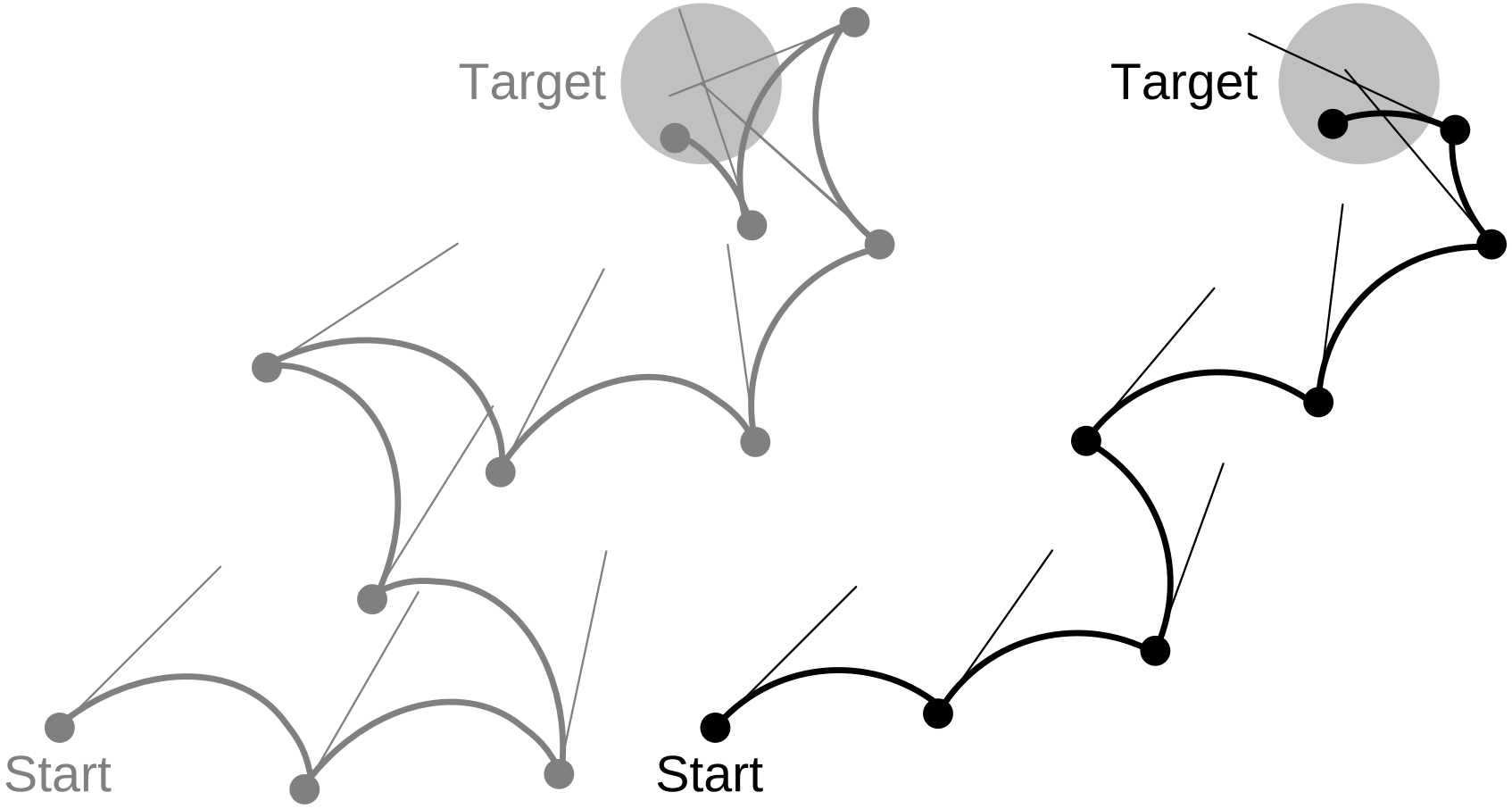
Feedback

stepsize: 3 months
elapsed time: 25 months

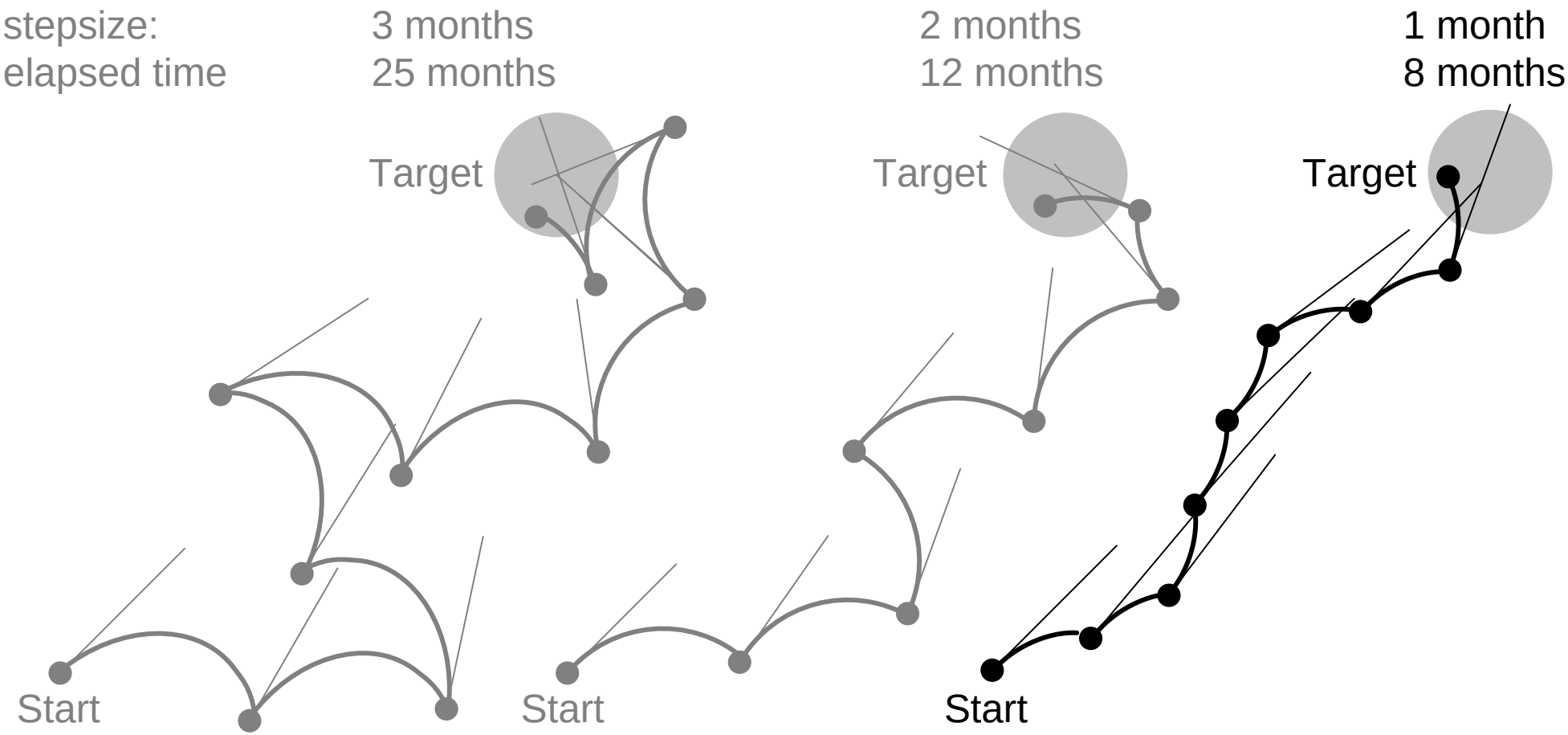


Feedback (2)

stepsize: 3 months 2 months
elapsed time 25 months 12 months

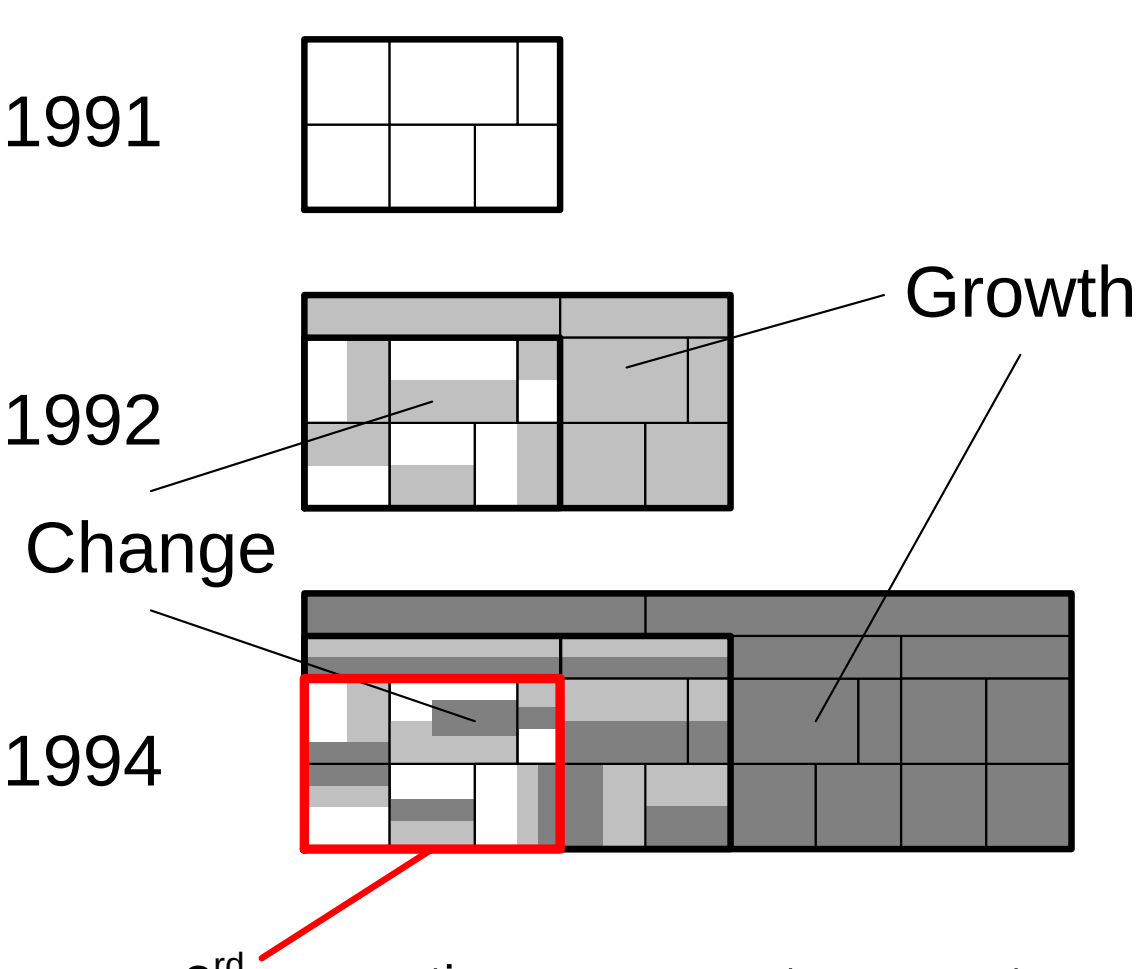


Feedback (3)



Small feedback cycles result in Faster Time to Market

Platform Evolution (Easyvision 1991-1996)



Last changed in:

1991

1992

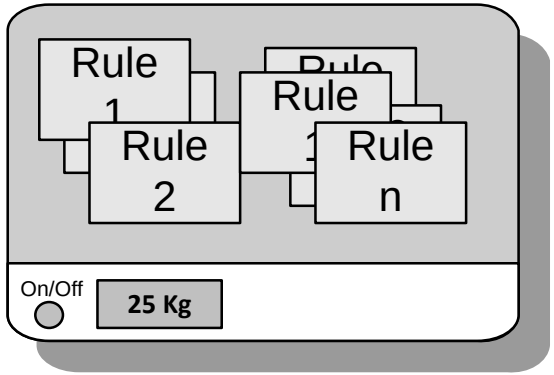
1994

3rd generation components are mature, active maintenance needed.
Growth and change continues, some "old" components become obsolete

Part 2:
The Weight of an Architecture;
Architectural Chaos or Bureaucratic Control?

Architecture Weight

$$\text{weight(architecture)} = \sum_{\text{all rules}} \text{weight(rule)}$$



weight (rule) = f (level of **enforcement** ,

scope (impact) ,

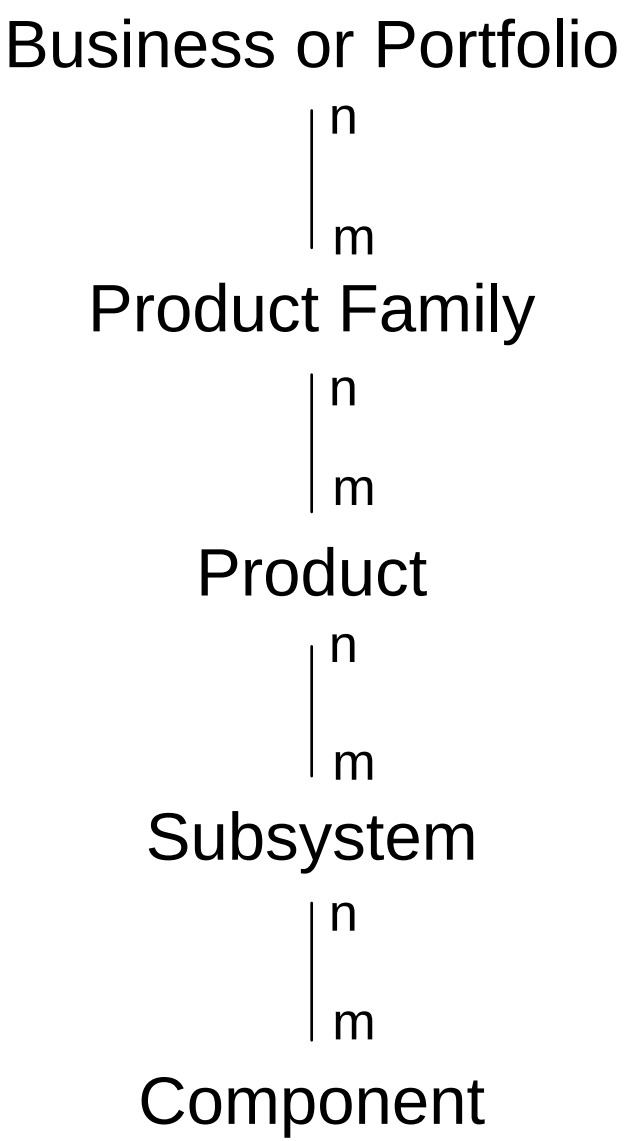
size,

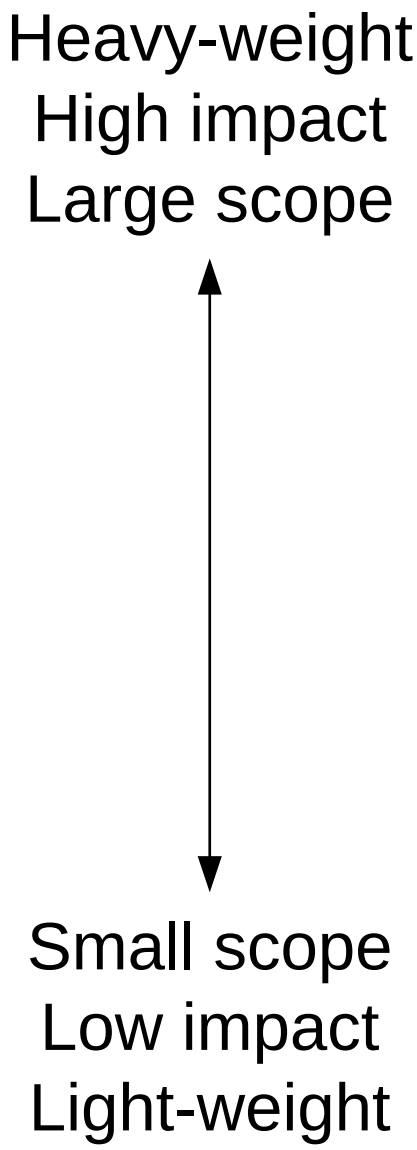
level of **coupling** or number of dependencies)

guideline	conditional rule	mandatory rule
component	product	portfolio
single-line	multi-line	multi-page
stand-alone		builds on many rules

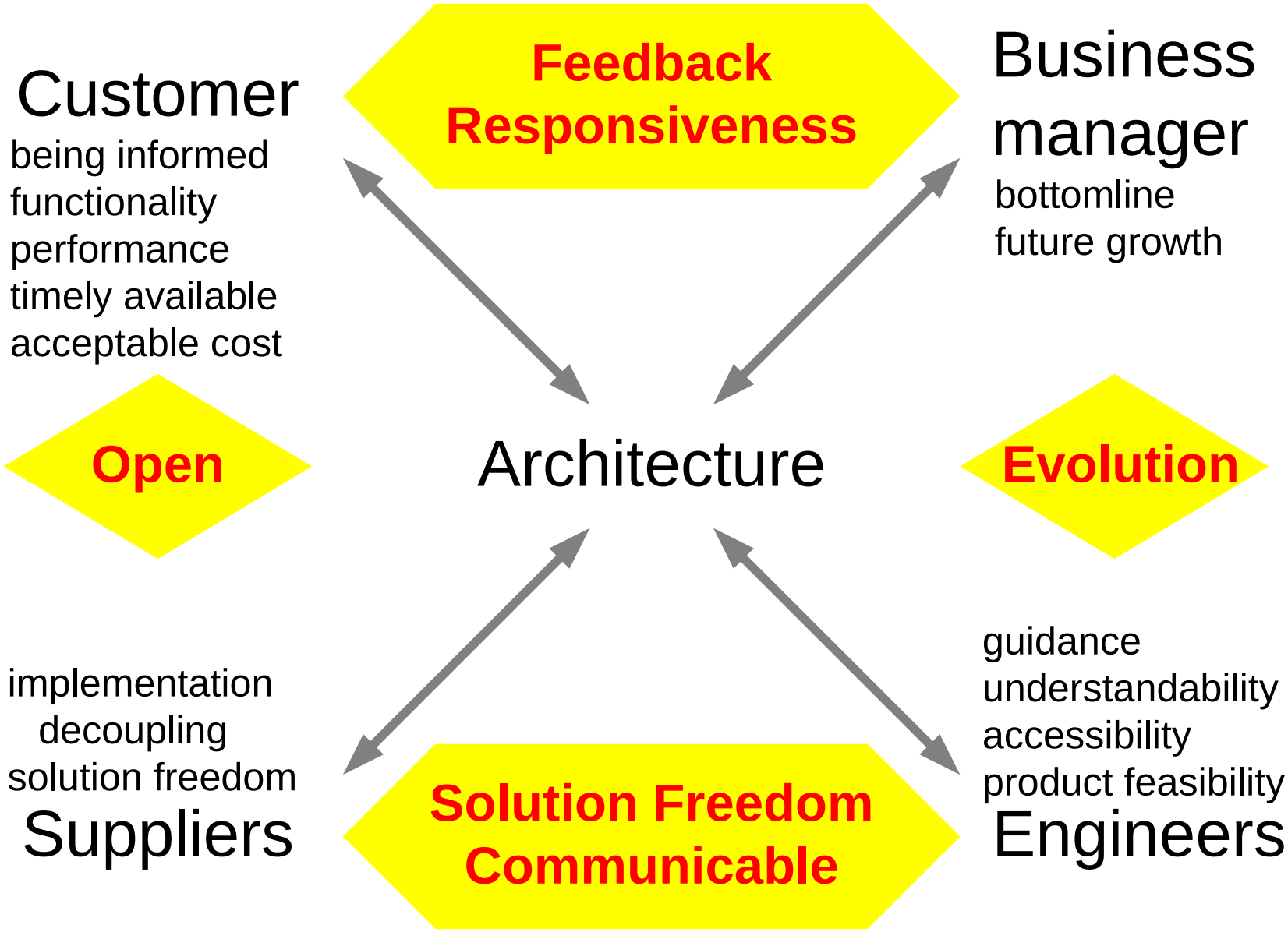
← low —— weight —— high →

Scope and Impact

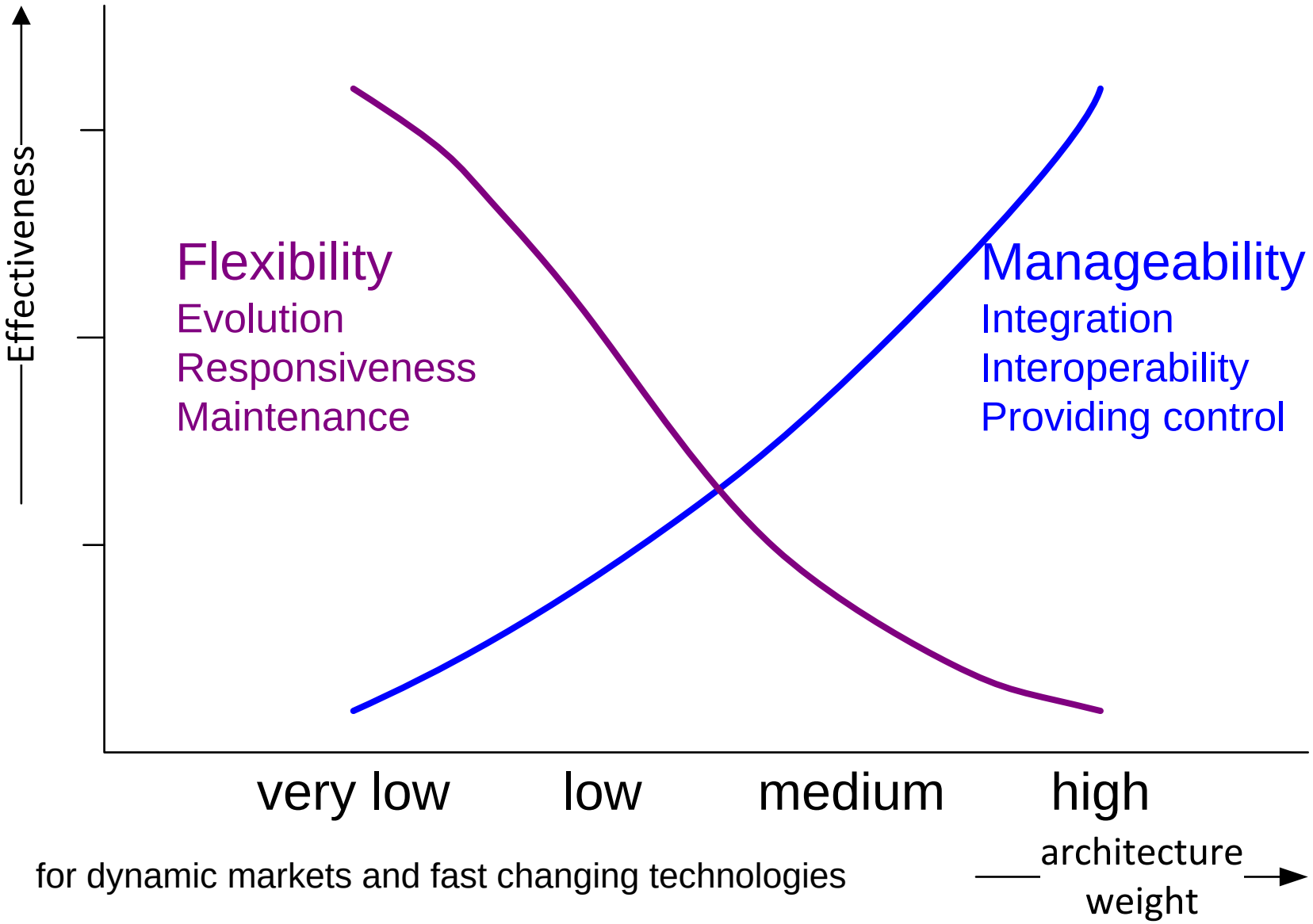




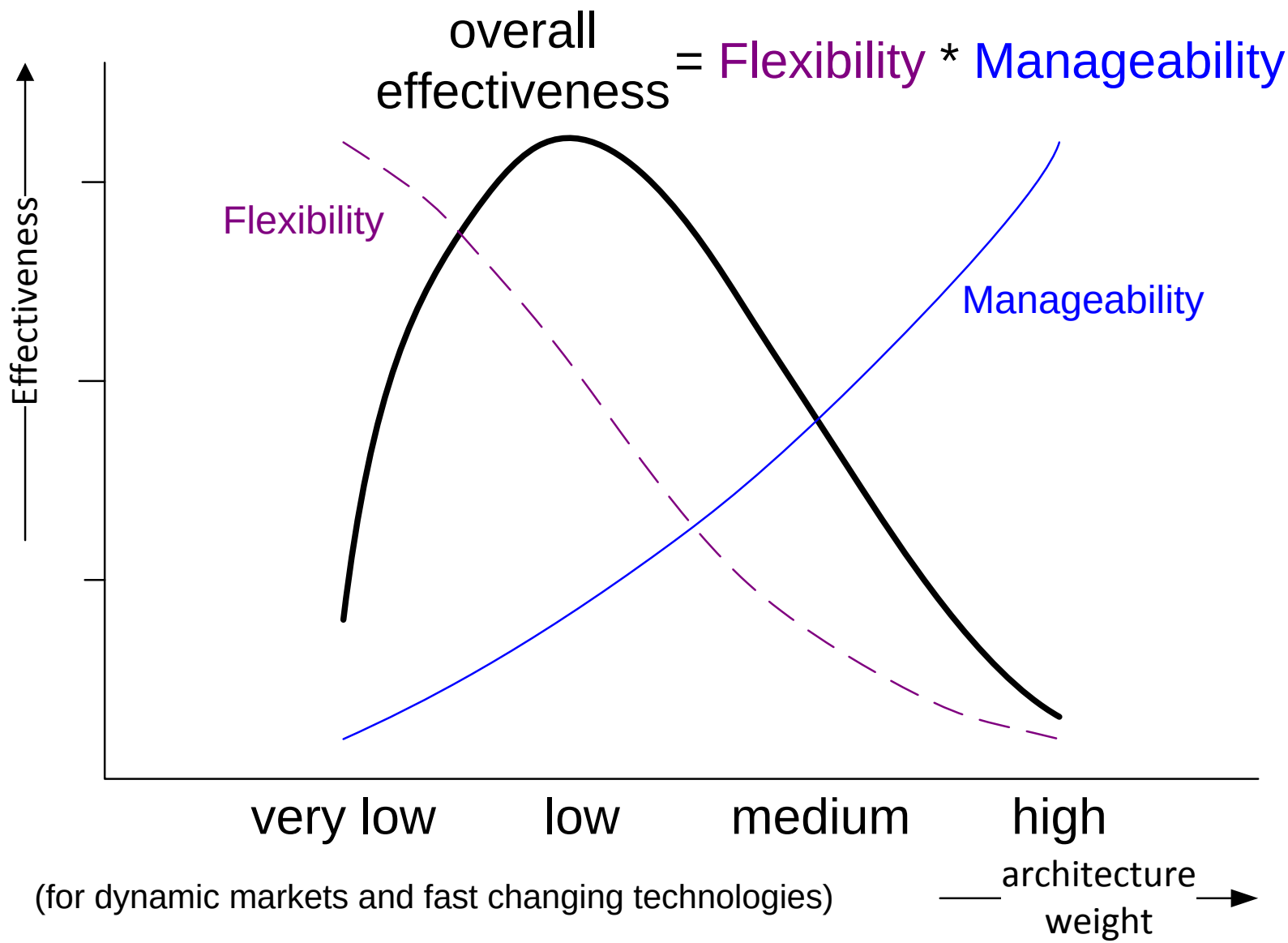
Criteria for an Architecture



Weight versus Effectiveness



Conclusion Part 2



Light Weight How -To

$$\text{weight(architecture)} = \sum_{\text{all rules}} \text{weight(rule)}$$

2. Minimize the weight per rule

1. Reduce the rule set to the (business) essential

Understand

- your customer
- your customer's customer

etcetera

Minimize Rule Weight

weight(rule)=

f (level of **enforcement** ,

scope (impact) ,

size,

level of **coupling** or
number of dependencies)

minimize number of mandatory rules

empower, delegate

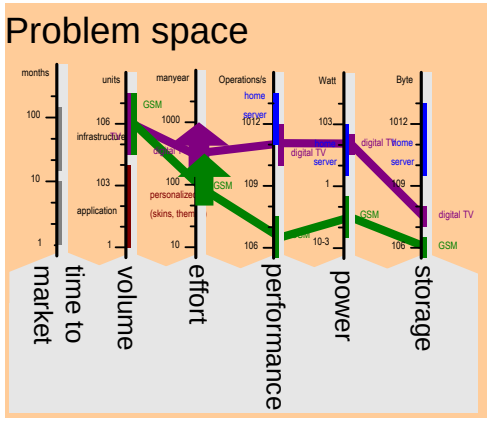
minimize implementation details
focus on essential concepts

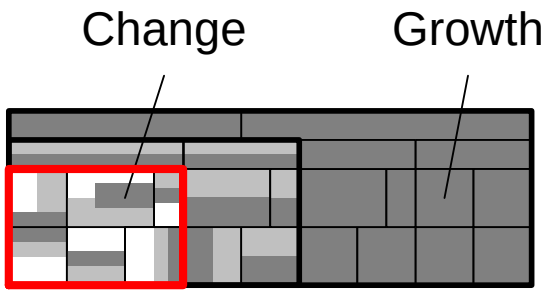
Apply design principles on architecture

Multi-view architecting

Summary

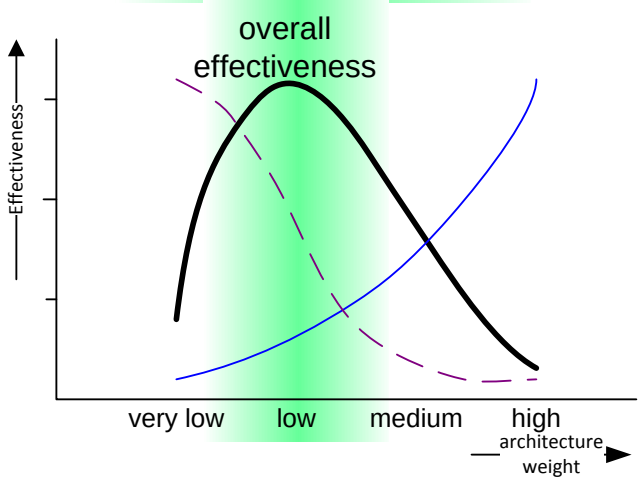
1A. Dynamic Market: Understand Your Customer





1B. Architecting in Practice: Change is normal, Stability is the exception

2. Optimal architecture: Light weight !



Acknowledgements

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- Jürgen Müller
- Peter van den Hamer
- Lex Heerink