

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.

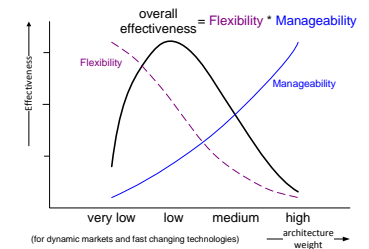
To satisfy the needs of these customers an integral approach is required. Architectures play a key role in such an integral approach.

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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status: finished
version: 2.3



What is Architecture?

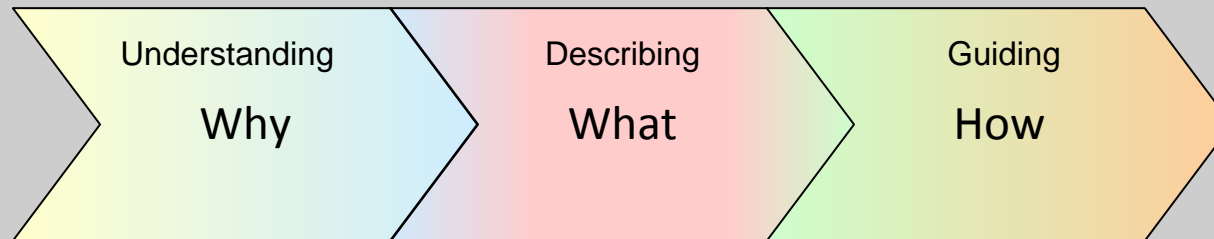


Do the right things

Do the things right

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1A. Do the right things; The Dynamic Market



1B. Do the things right; Lessons from Practice

This appliance may only be used for non commercial use
accuracy +/- 200 g

On/Off

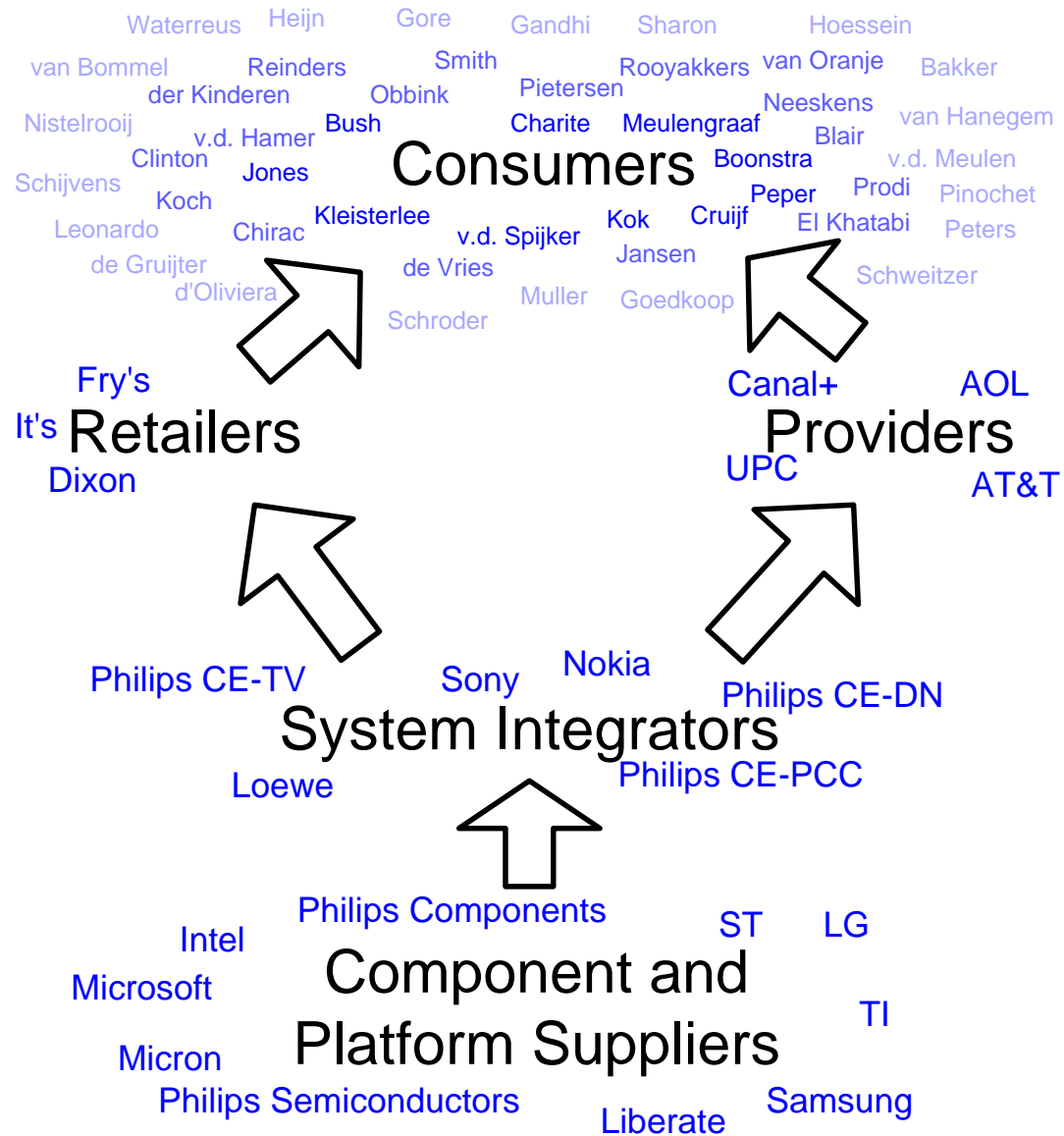


25 Kg

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

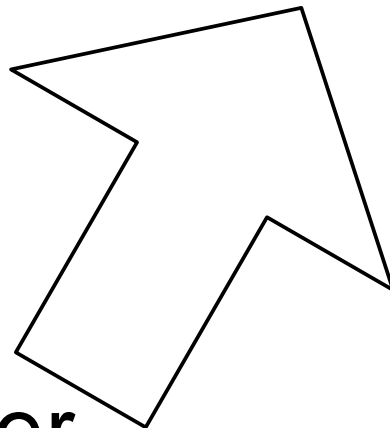
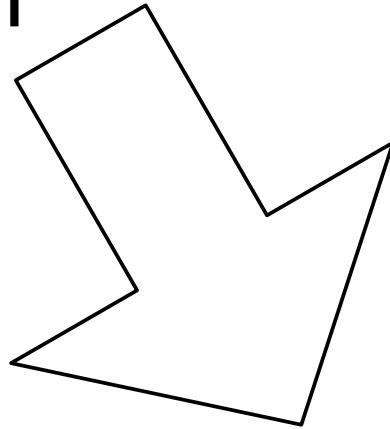
Part 1A:
Do the right things;
The Dynamic Market

Value chain

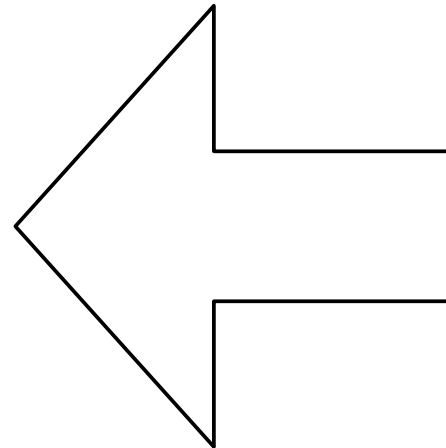


Convergence

Telecom



Consumer



Computer

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



Communicator



Ambient Intelligence
living room



car navigation



computer



games



flat display

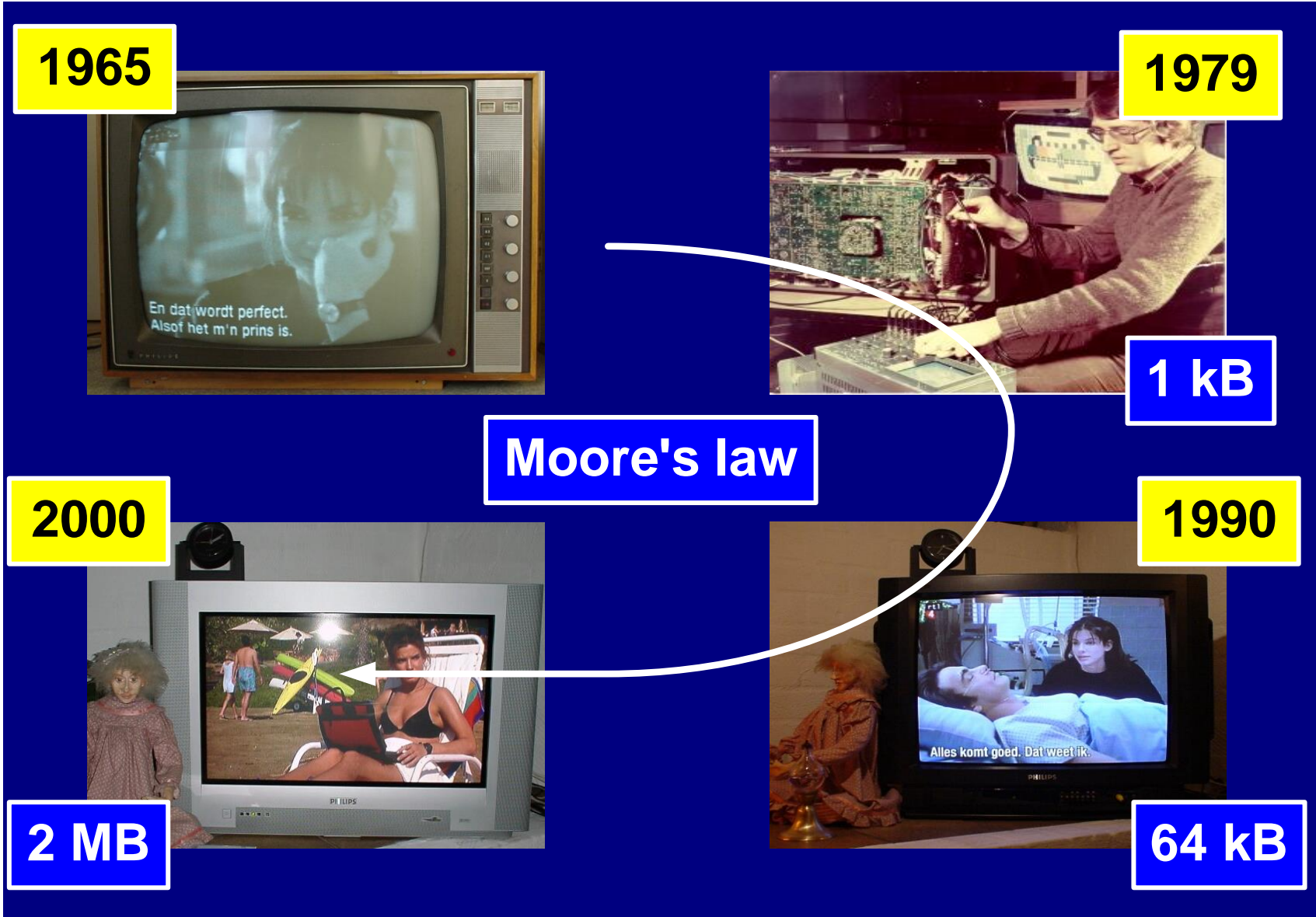
Uncertainty (Dot.Com effect)



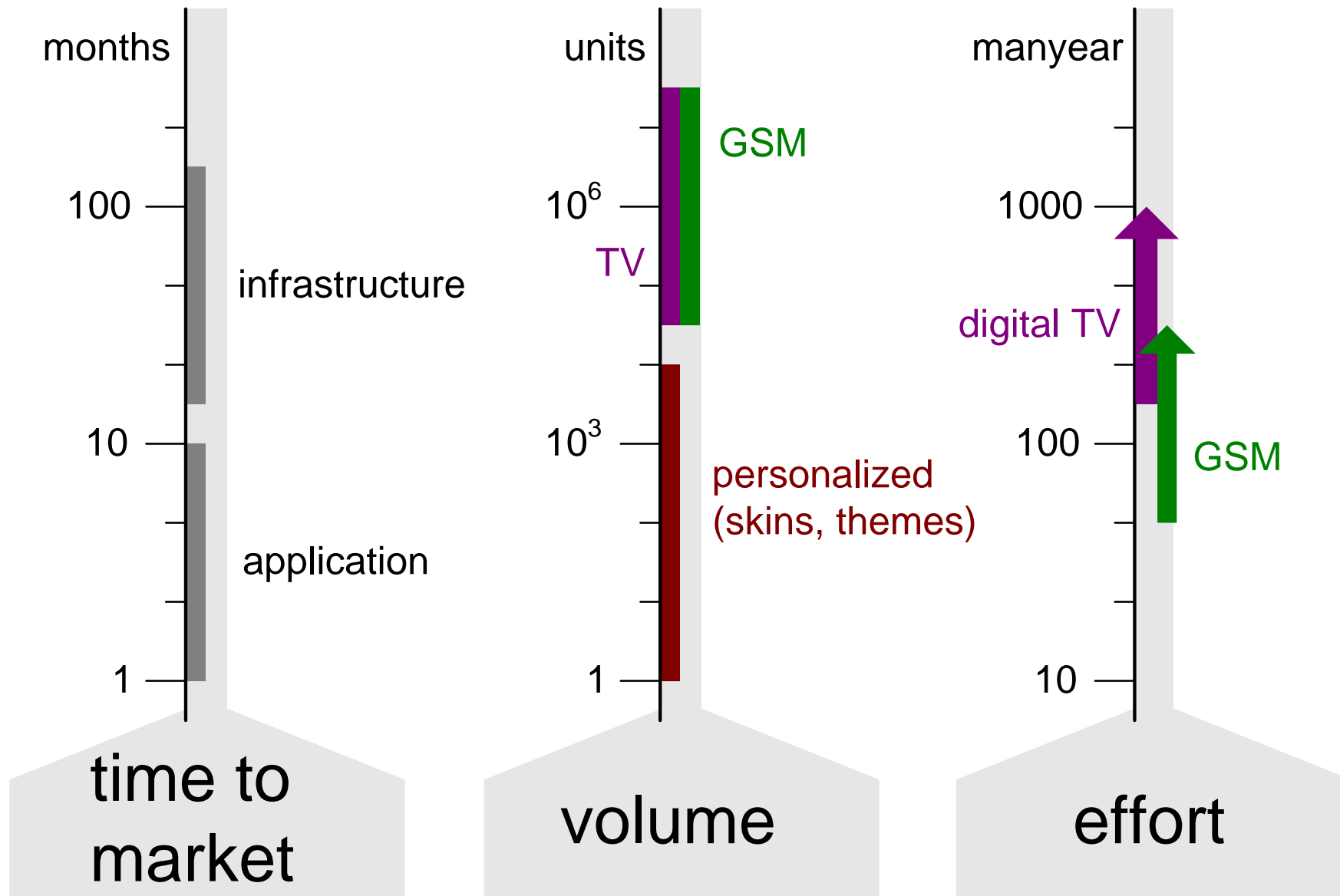
source: BigChart.com
dd march 19, 2001

Moore's law

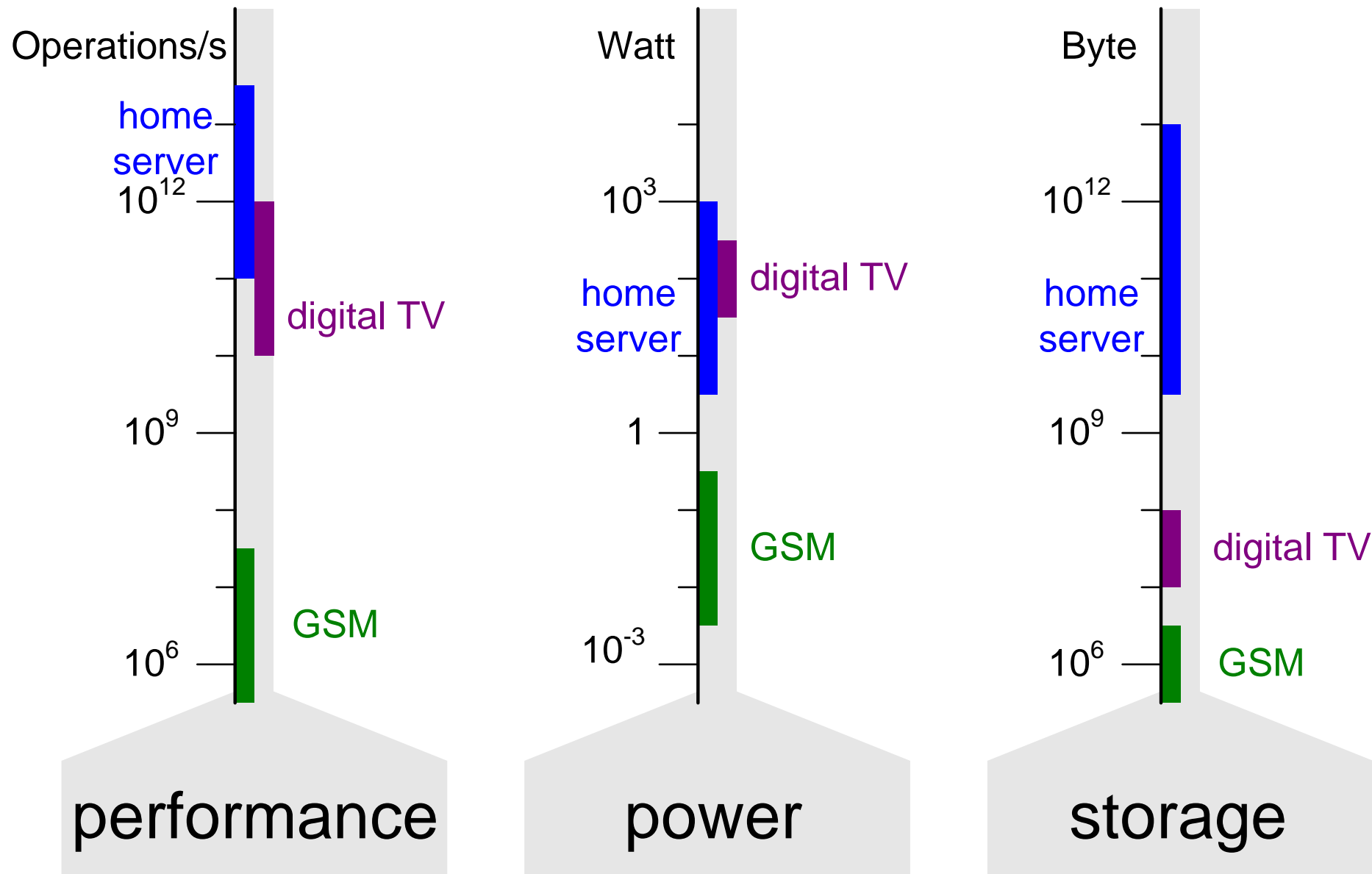
From: COPA tutorial, Rob van Ommering



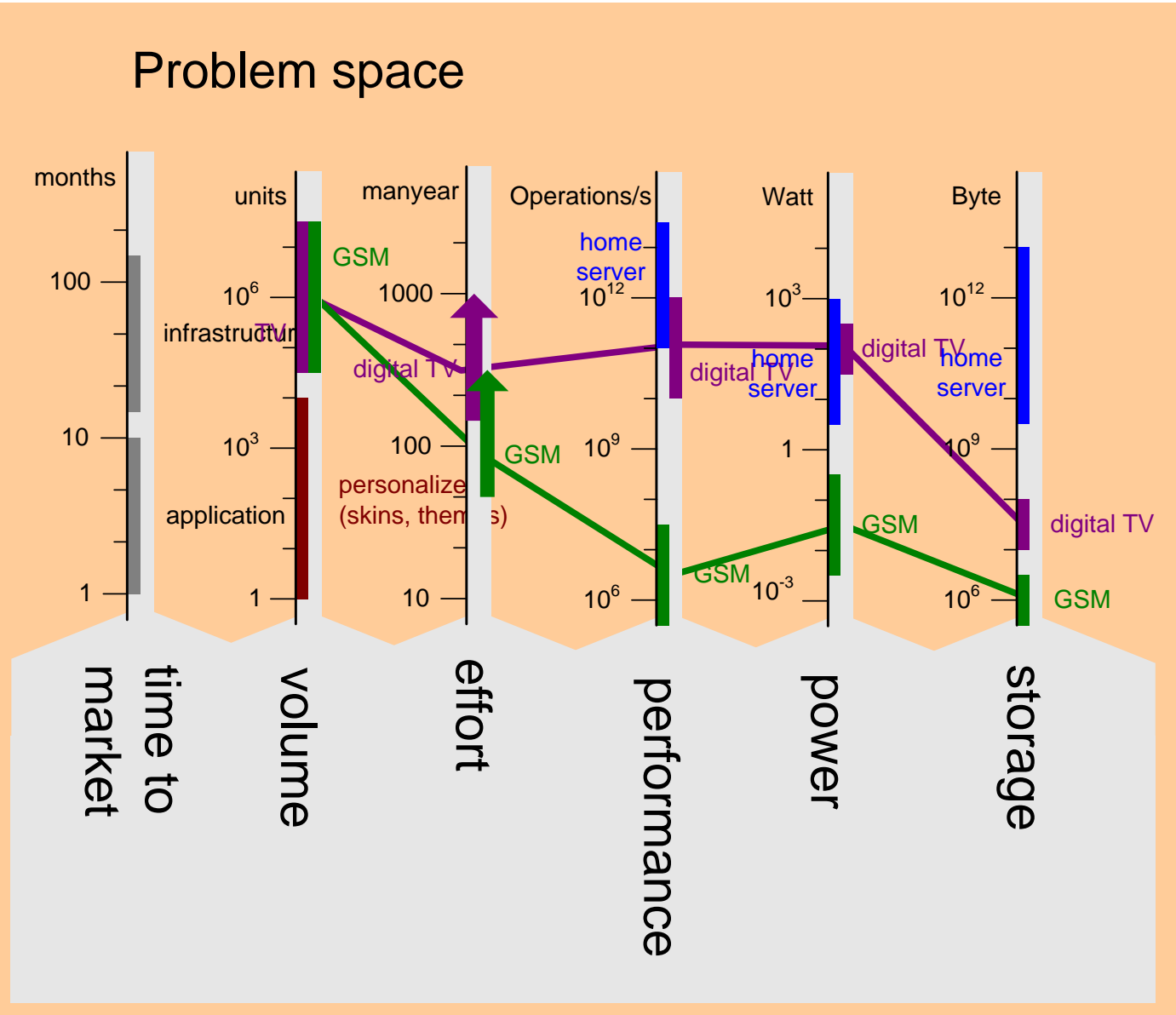
System Integrator Problem Space - Business



System Integrator Problem Space - Technology



System profile



Partial Solution: Configurable Component Platform

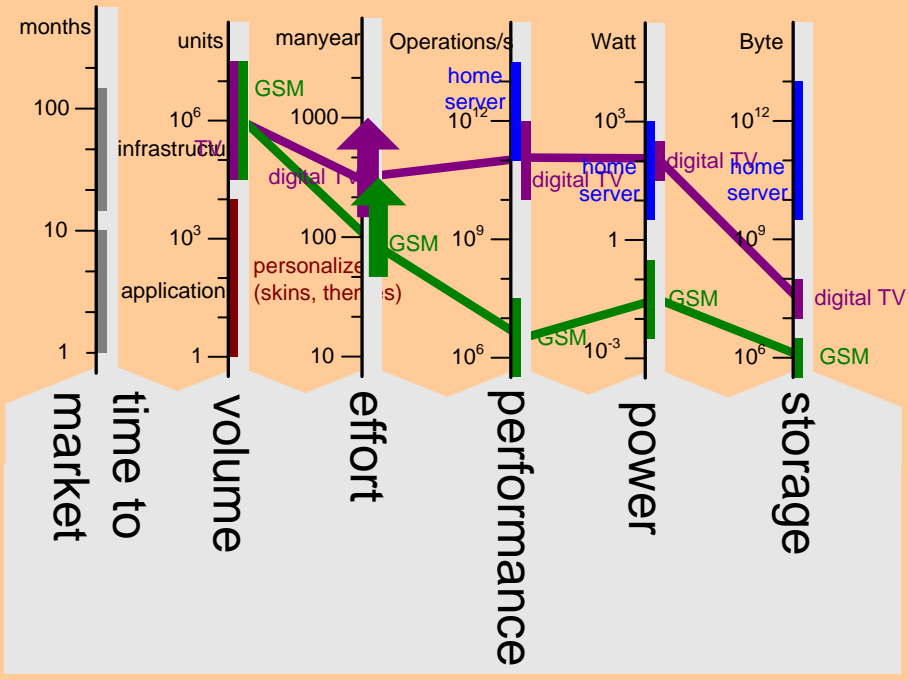
Technologies \ Systems	Technologies														
	MIPS	TriMedia	MPEG decoder	ARM	Real	GSM	RF amp	Bluetooth	TCP/IP	MP3	pSOS	WinCE	1394	GPS	
watch				●	○	○	○	●	○	○	●	○		○	
communicator	○	○	○	●	●	●	●	○	●	○	●	○		○	
digital TV	●	●	●					○	○	○	●	○	●		
set top box	●	●	●					○	●	○	●	○	●		
pda	○	○	○	●	○	○	○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

● required

○ optional

Exploring problem space and solution ingredients

Problem space



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

Solution ingredients

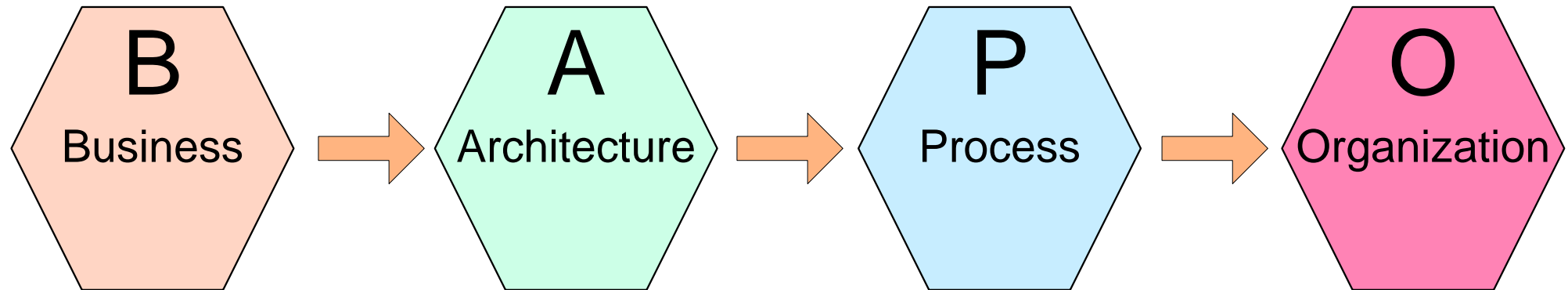
Configurability

Programmability, flexibility

Increase supplier content

Competitive Performance / cost / power

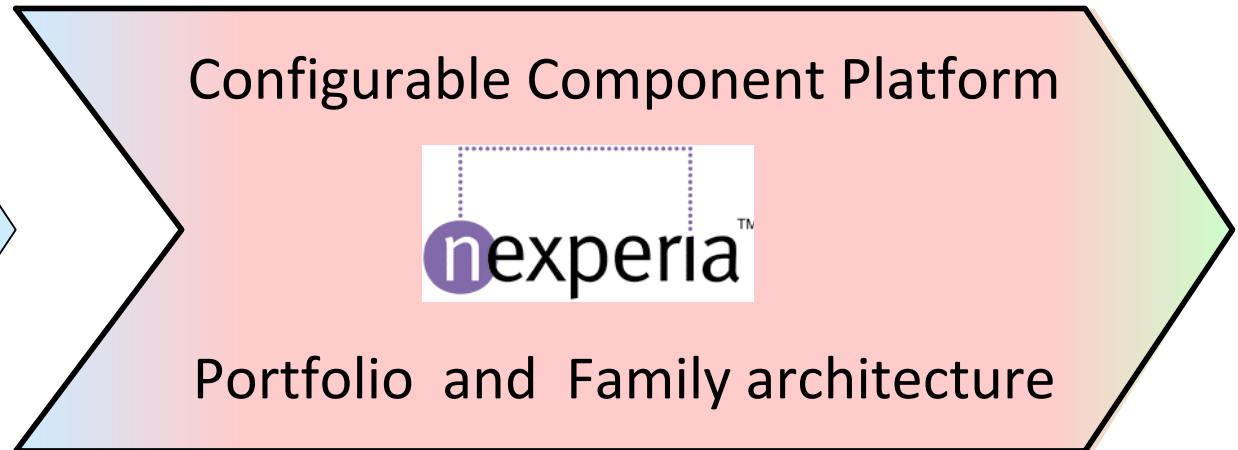
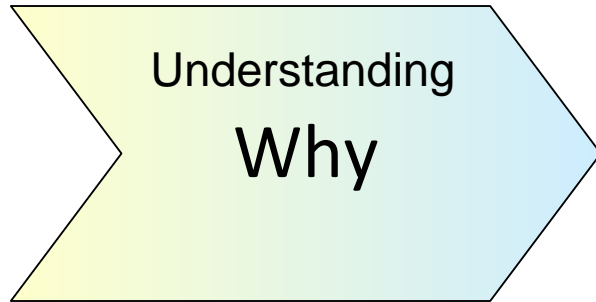
More than Architecture



From: COPA tutorial;
Philips SW conference 2001.

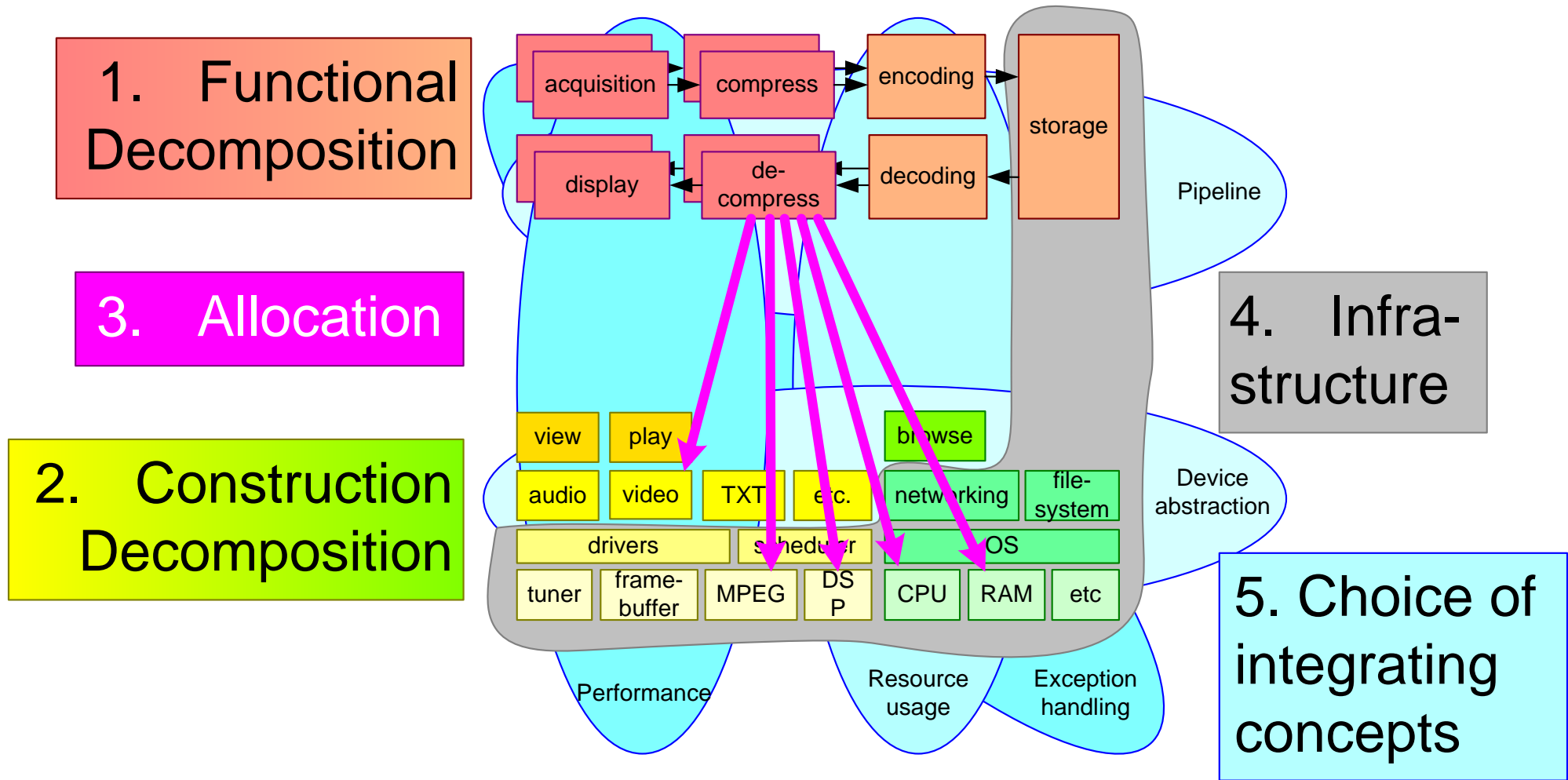
Architecture only works if the complementary viewpoints are addressed consistently

Conclusions Part 1A

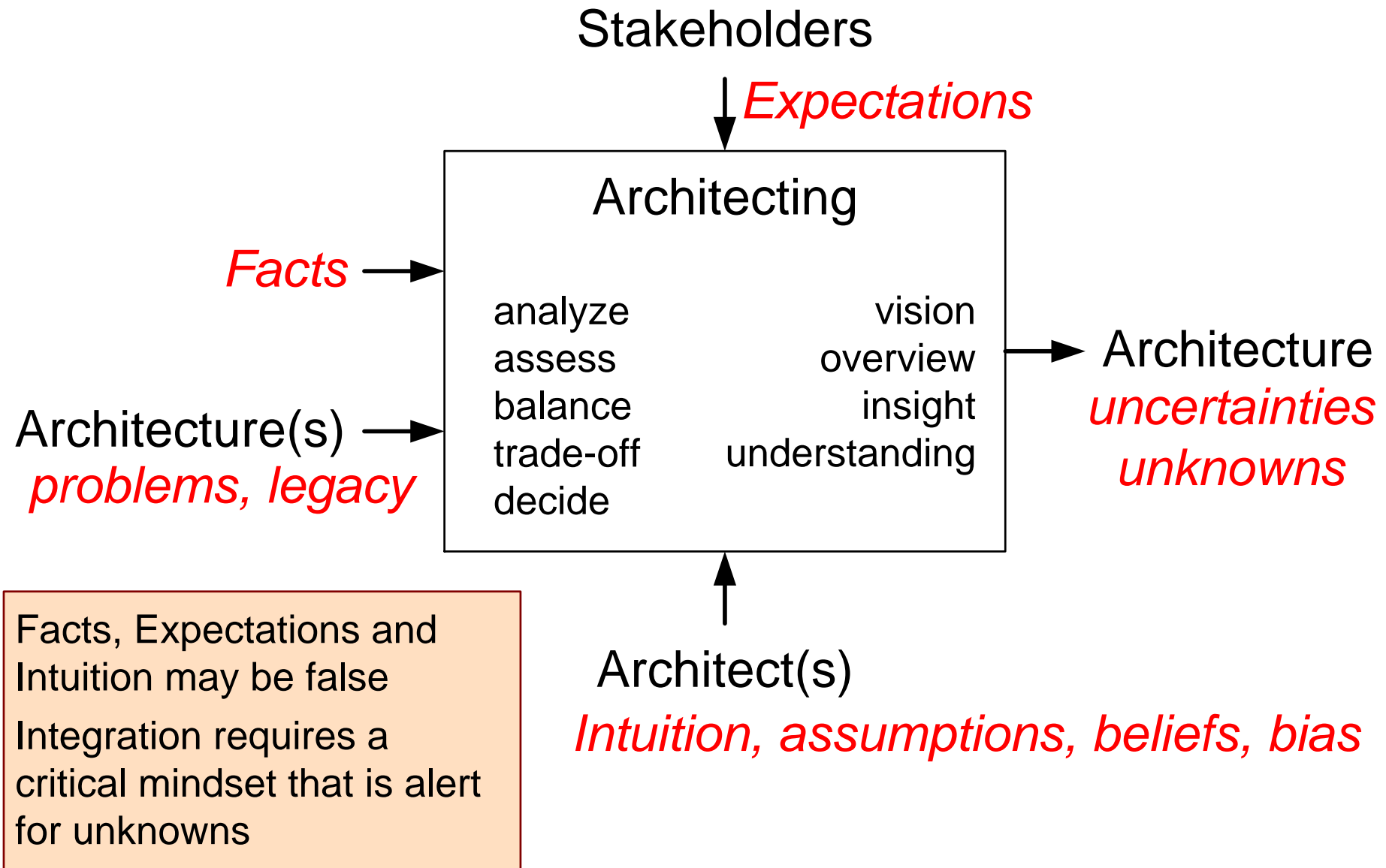


Part 1B:
Do the things right;
Lessons from Practice

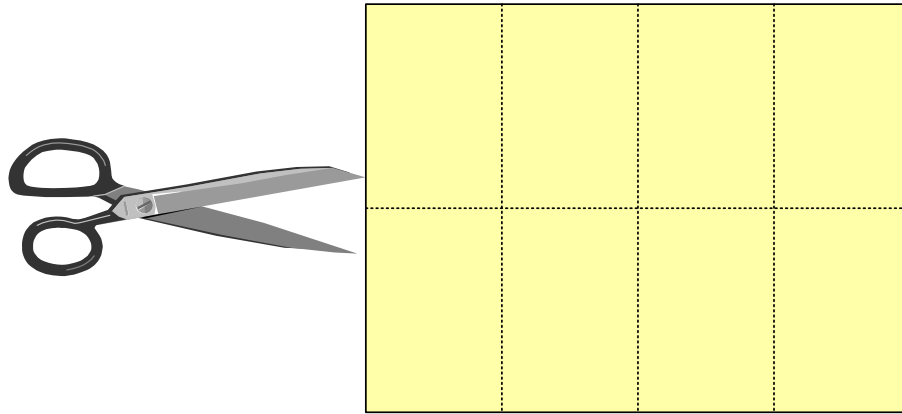
"Guiding How" by providing rules for:



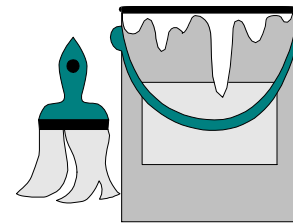
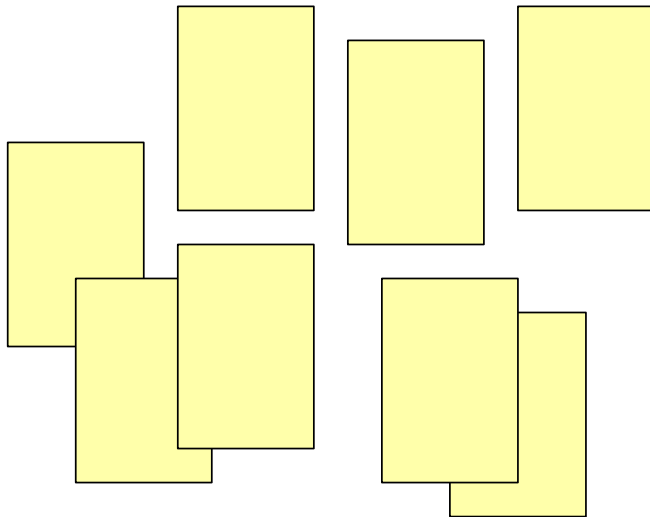
The Art of Architecting



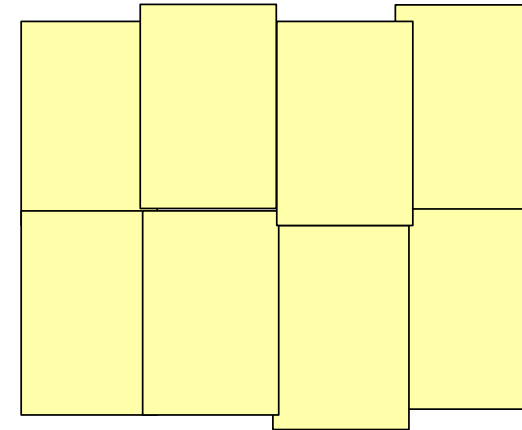
Architecting is much more than Decomposition



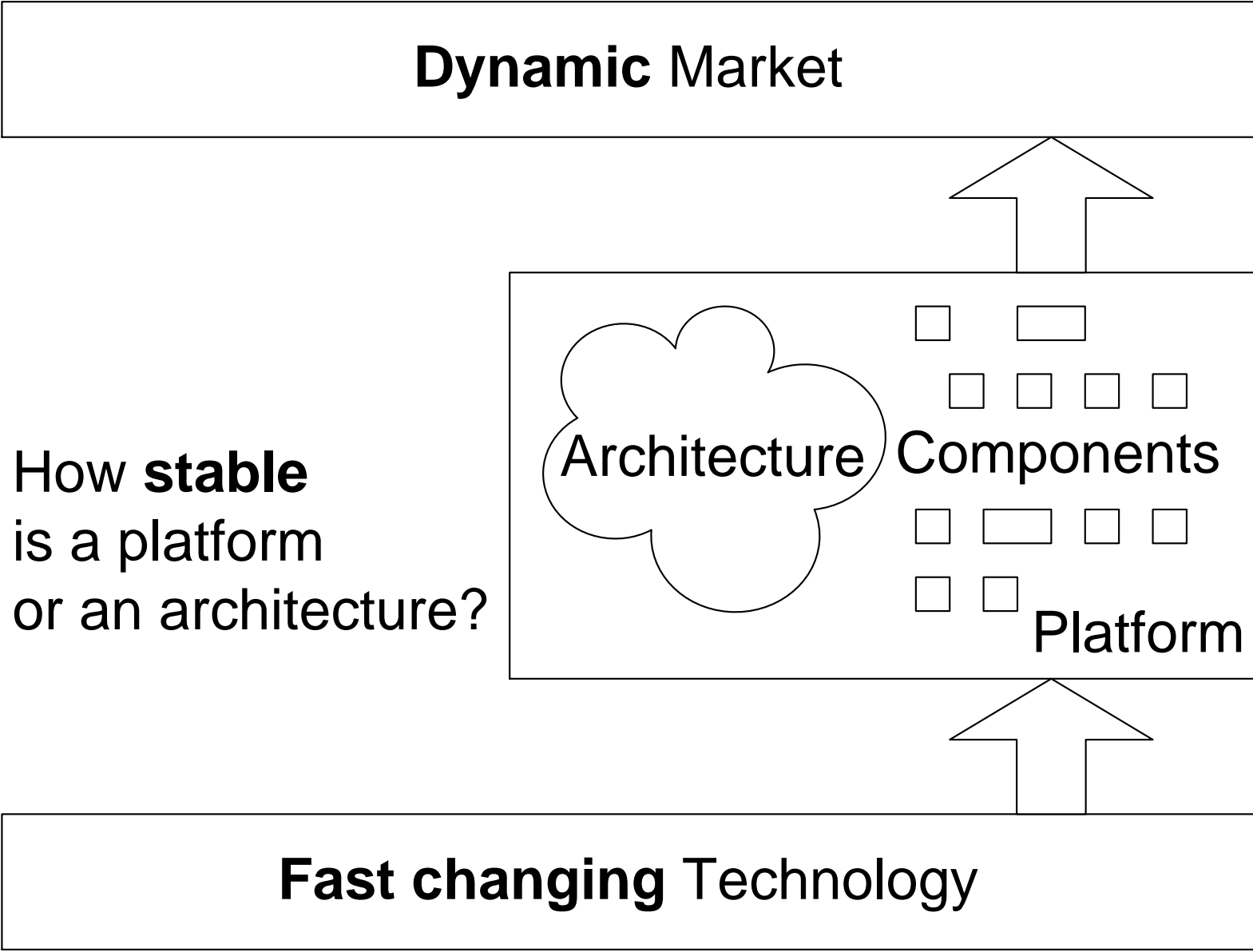
Decomposition
is "easy" ↓



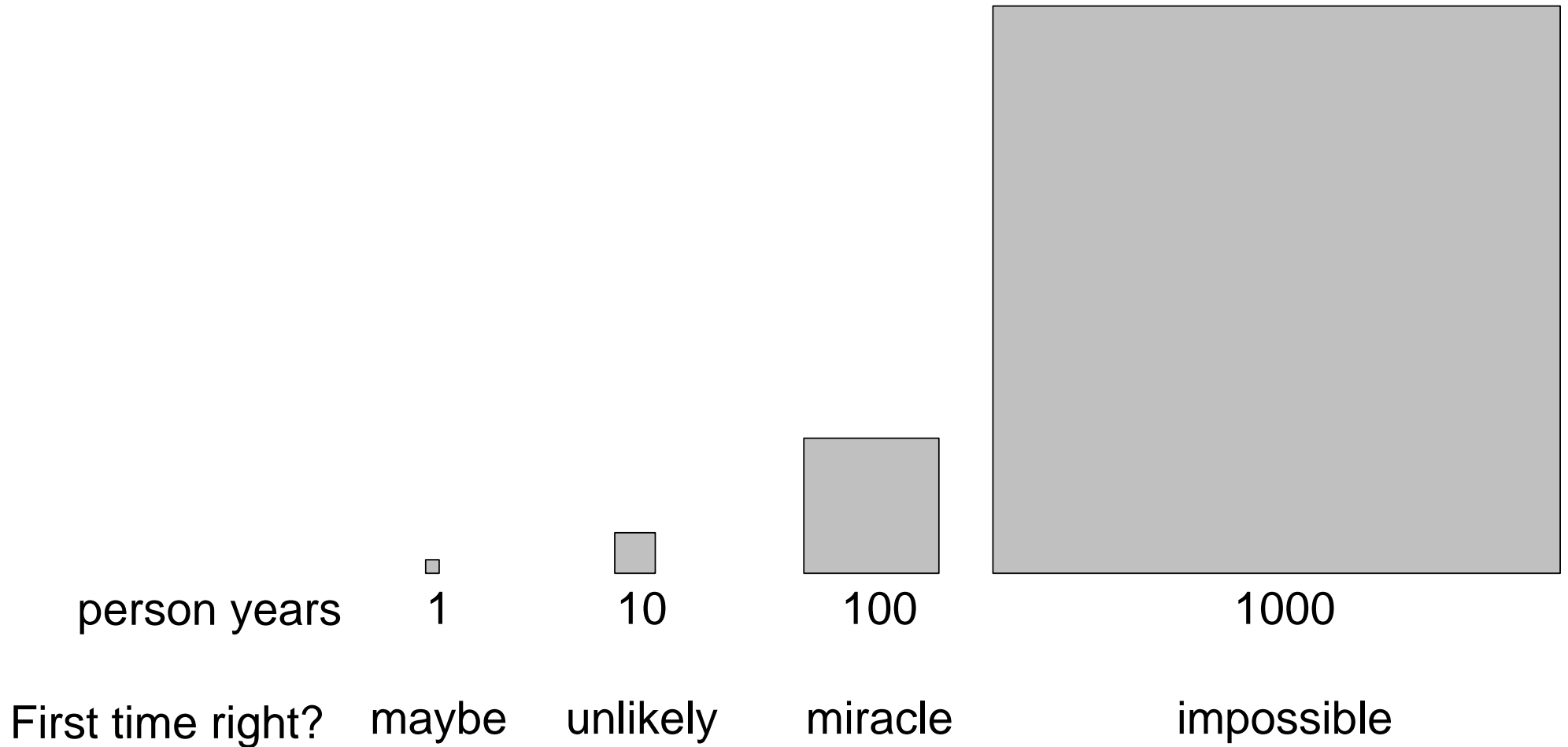
→
Integration is
difficult



Myth: Platforms are Stable

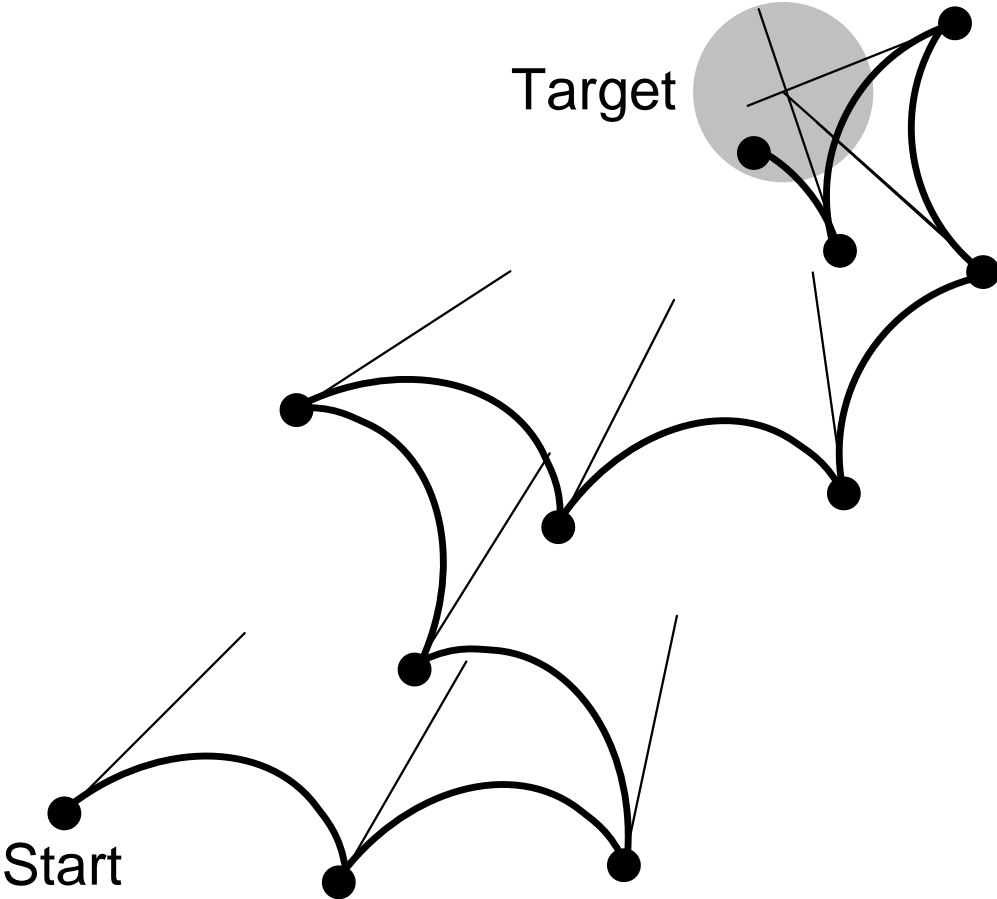


The first time right?



Feedback

stepsize: 3 months
elapsed time: 25 months

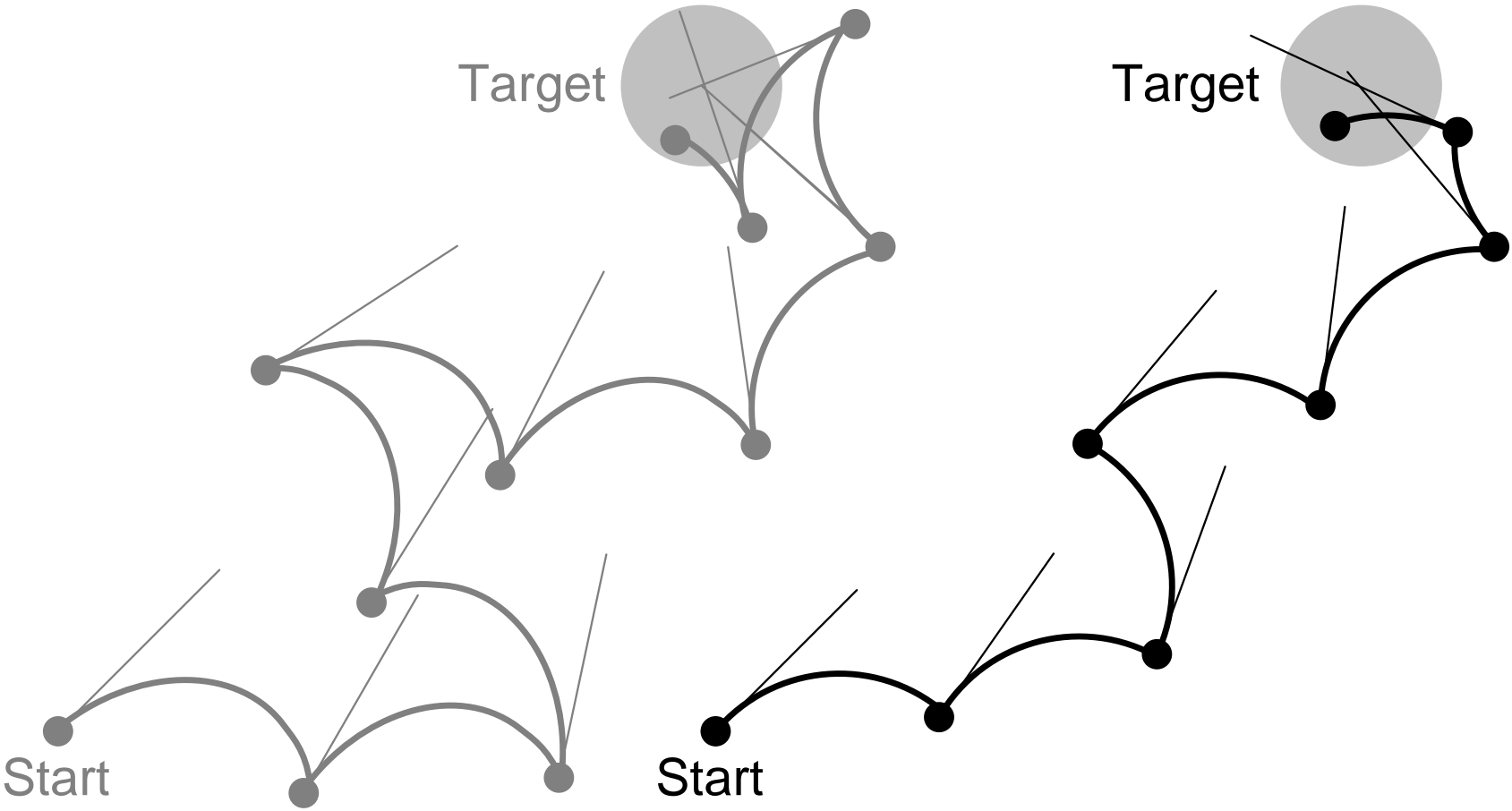


Feedback (2)

stepsize:
elapsed time

3 months
25 months

2 months
12 months



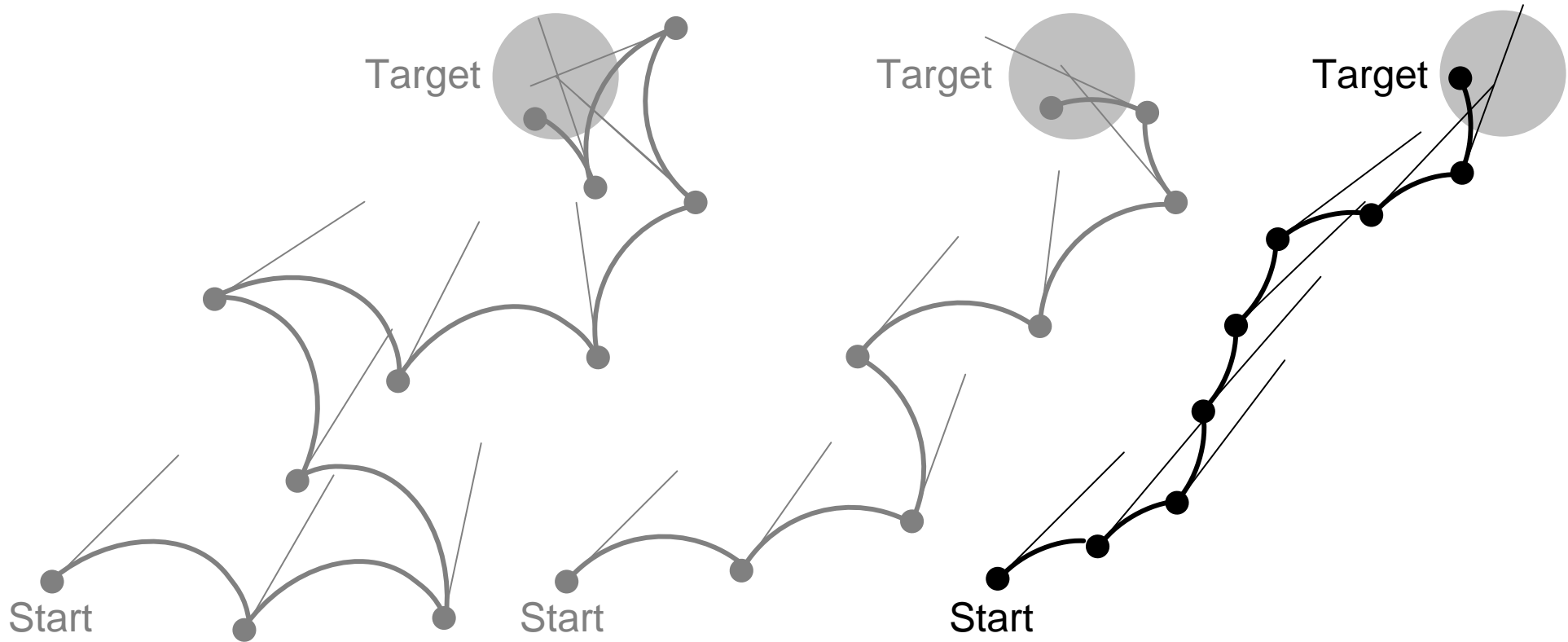
Feedback (3)

stepsize:
elapsed time

3 months
25 months

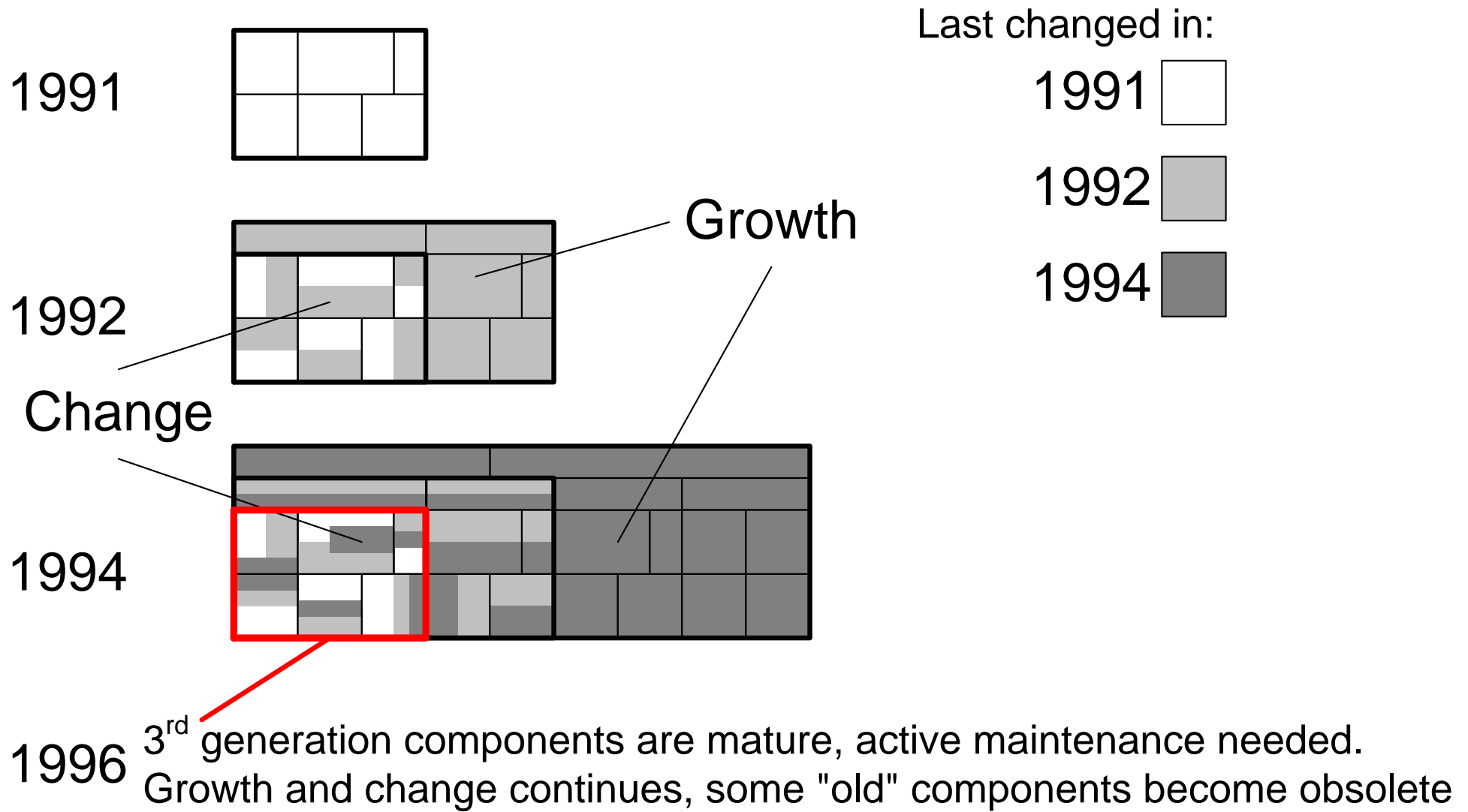
2 months
12 months

1 month
8 months



Small feedback cycles result in Faster Time to Market

Platform Evolution (Easyvision 1991-1996)

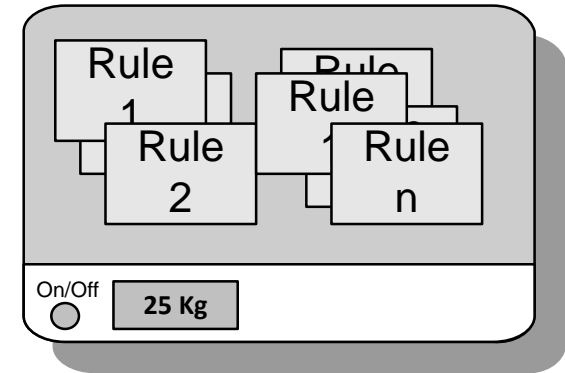


Part 2:

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

Architecture Weight

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



$\text{weight}(\text{rule}) = f ($
 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

Business or Portfolio

| n
| m

Product Family

| n
| m

Product

| n
| m

Subsystem

| n
| m

Component

Heavy-weight

High impact

Large scope

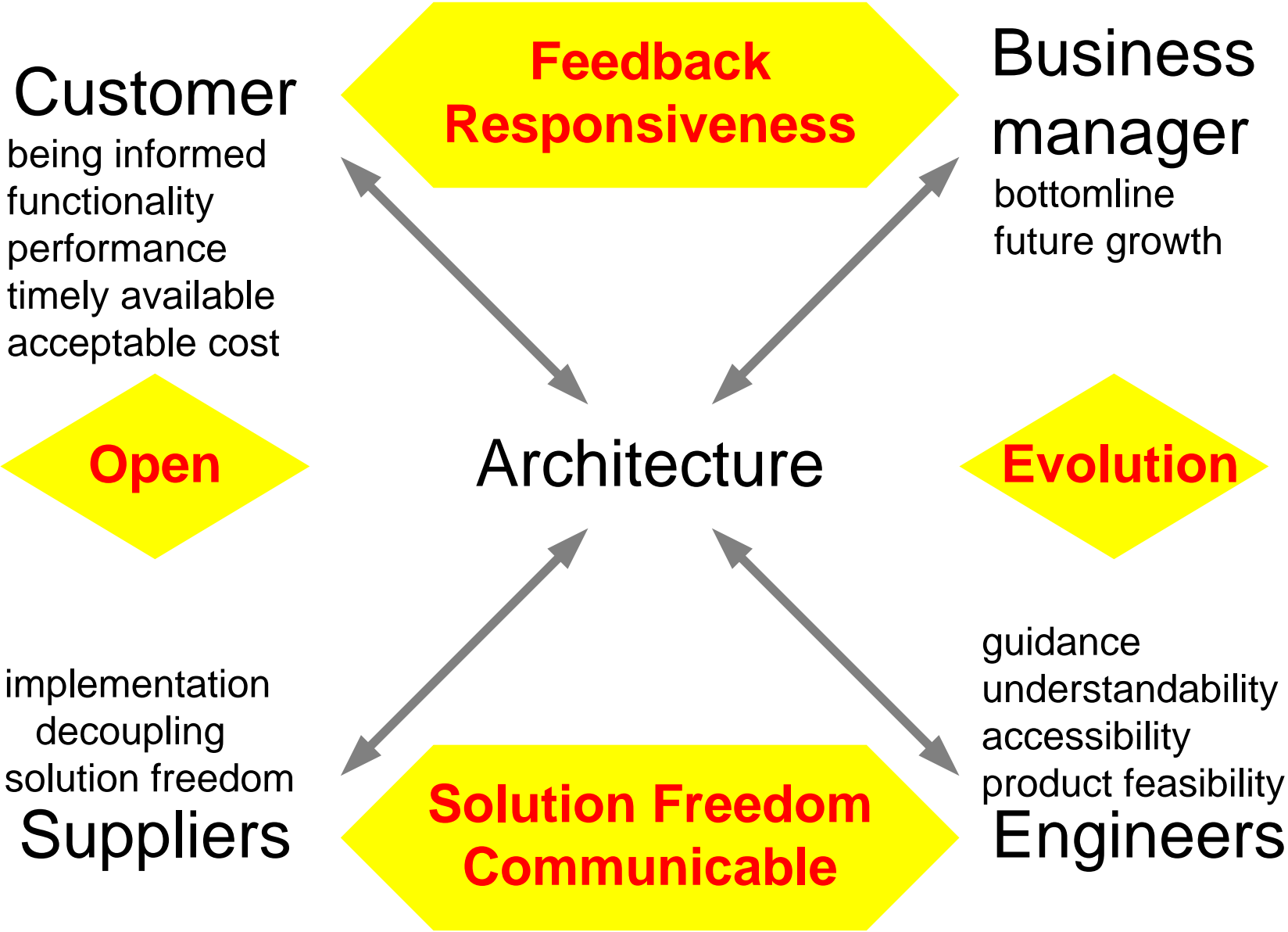


Small scope

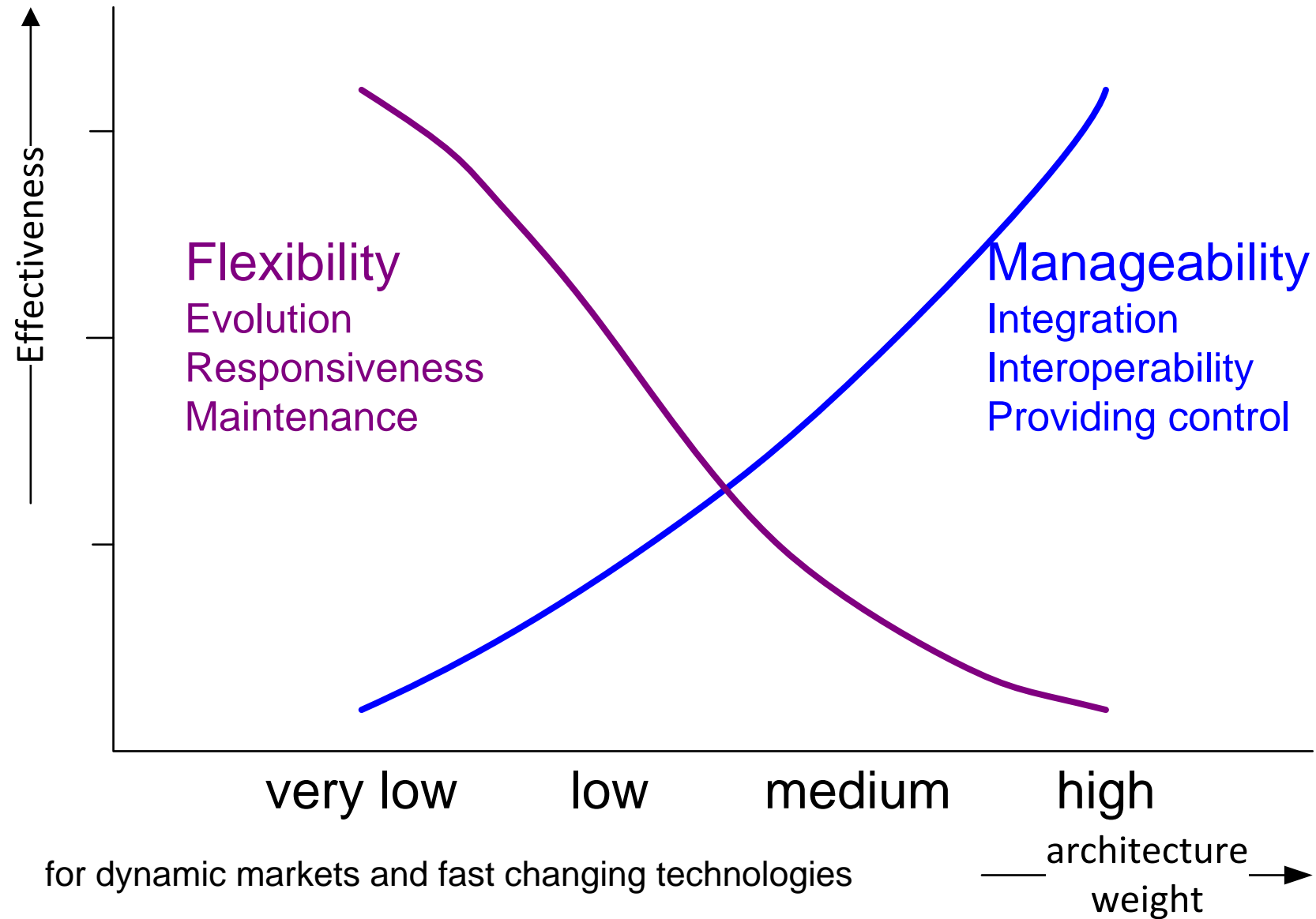
Low impact

Light-weight

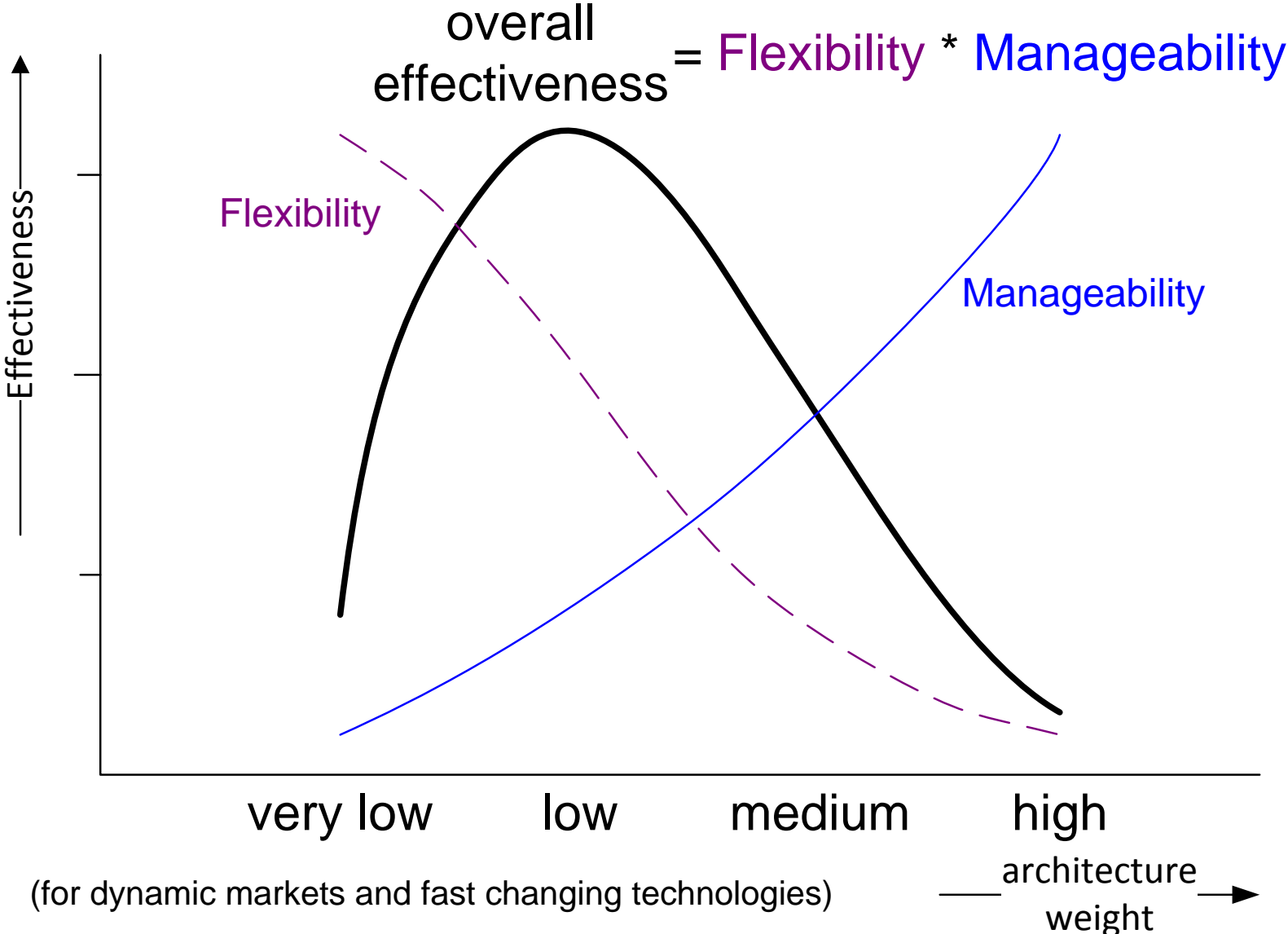
Criteria for an Architecture



Weight versus Effectiveness



Conclusion Part 2



Light Weight How -To

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

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)=

minimize number of mandatory rules

f (level of **enforcement** ,

empower, delegate

scope (impact) ,

minimize implementation details
focus on essential concepts

size,

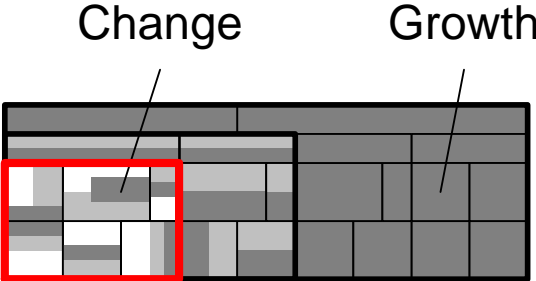
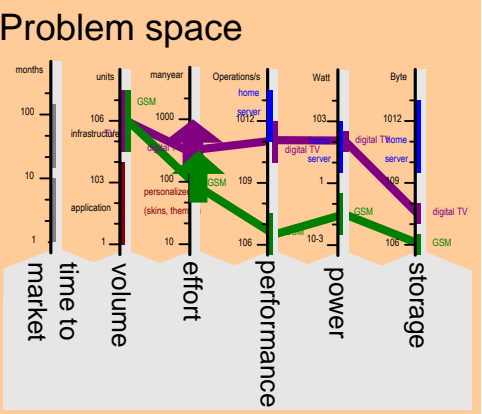
Apply design principles on architecture

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

Multi-view architecting

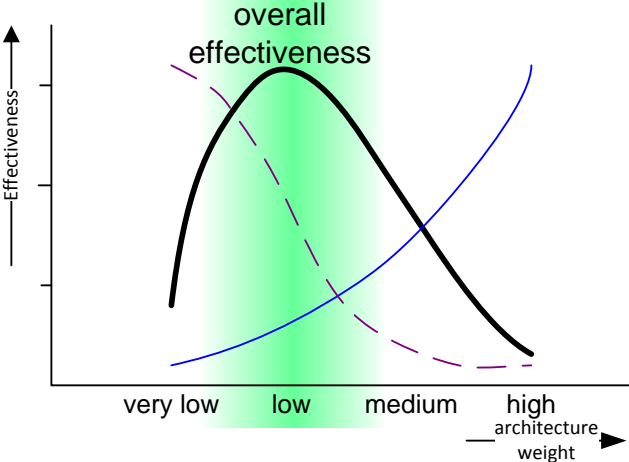
Summary

1A. Dynamic Market: Understand Your Customer



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

2. Optimal architecture: Light weight !



Acknowledgements

This presentation has been enabled by the inspiring and critical comments of:

- Jürgen Müller
- Peter van den Hamer
- Lex Heerink