Status of IT Architecting: Progression or Regression?

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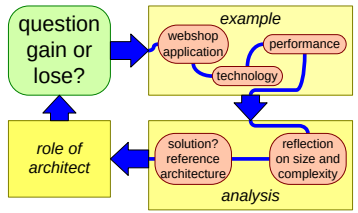
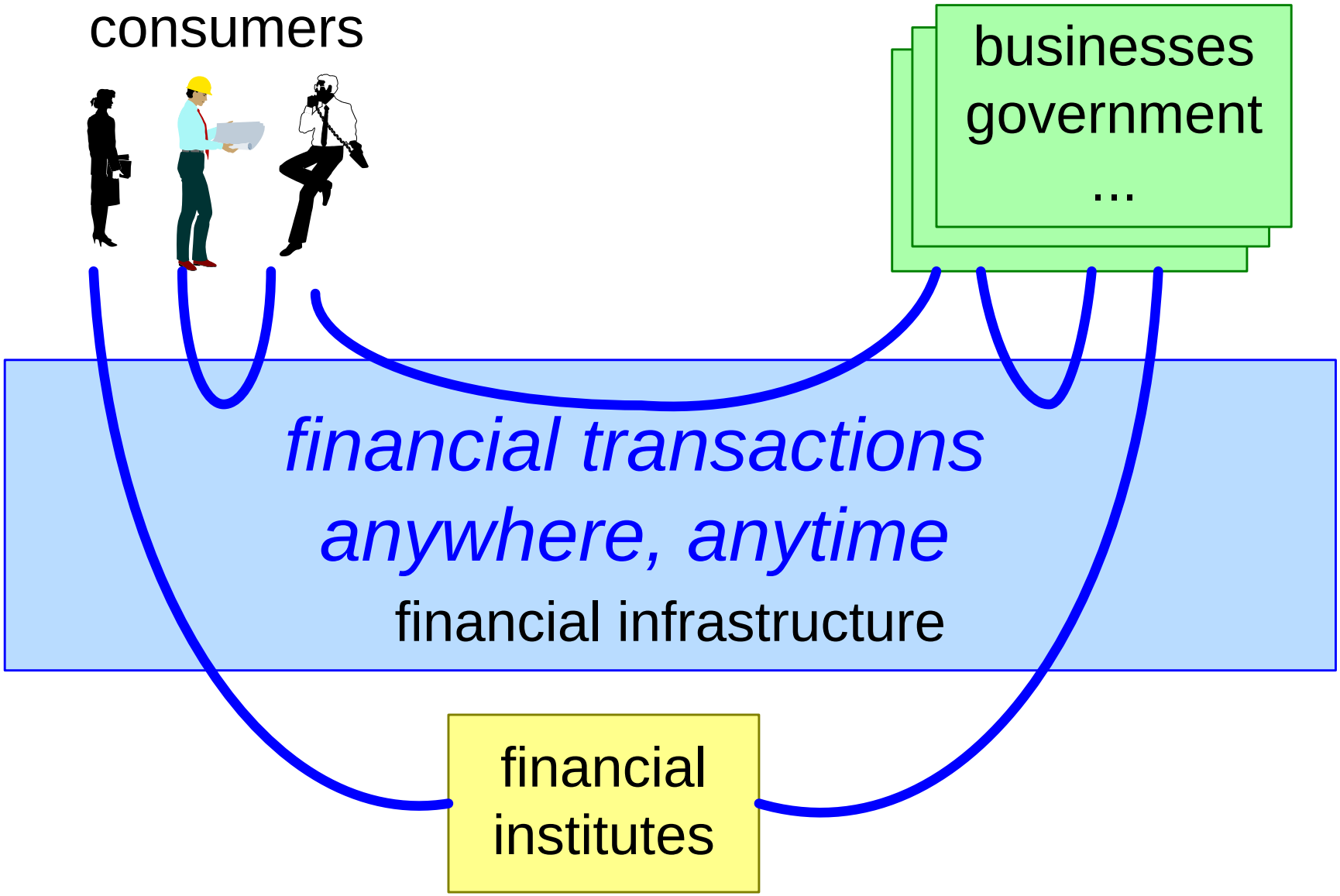
Abstract

Today's IT capabilities are seemingly limitless. From the point of view of last century we have amazing functionality available to consumers, businesses, governments et cetera. Technology advances have made this possible. At the same time we suffer from unwanted, unexpected incidents, ranging from slow or no response to loss or theft of sensitive data. The growth of systems and its complexity play a role. We will look at the role of the human creators of these systems and the availbale technology to discuss our concurrent progression and regression, and we will look at the role of the architect in particular.

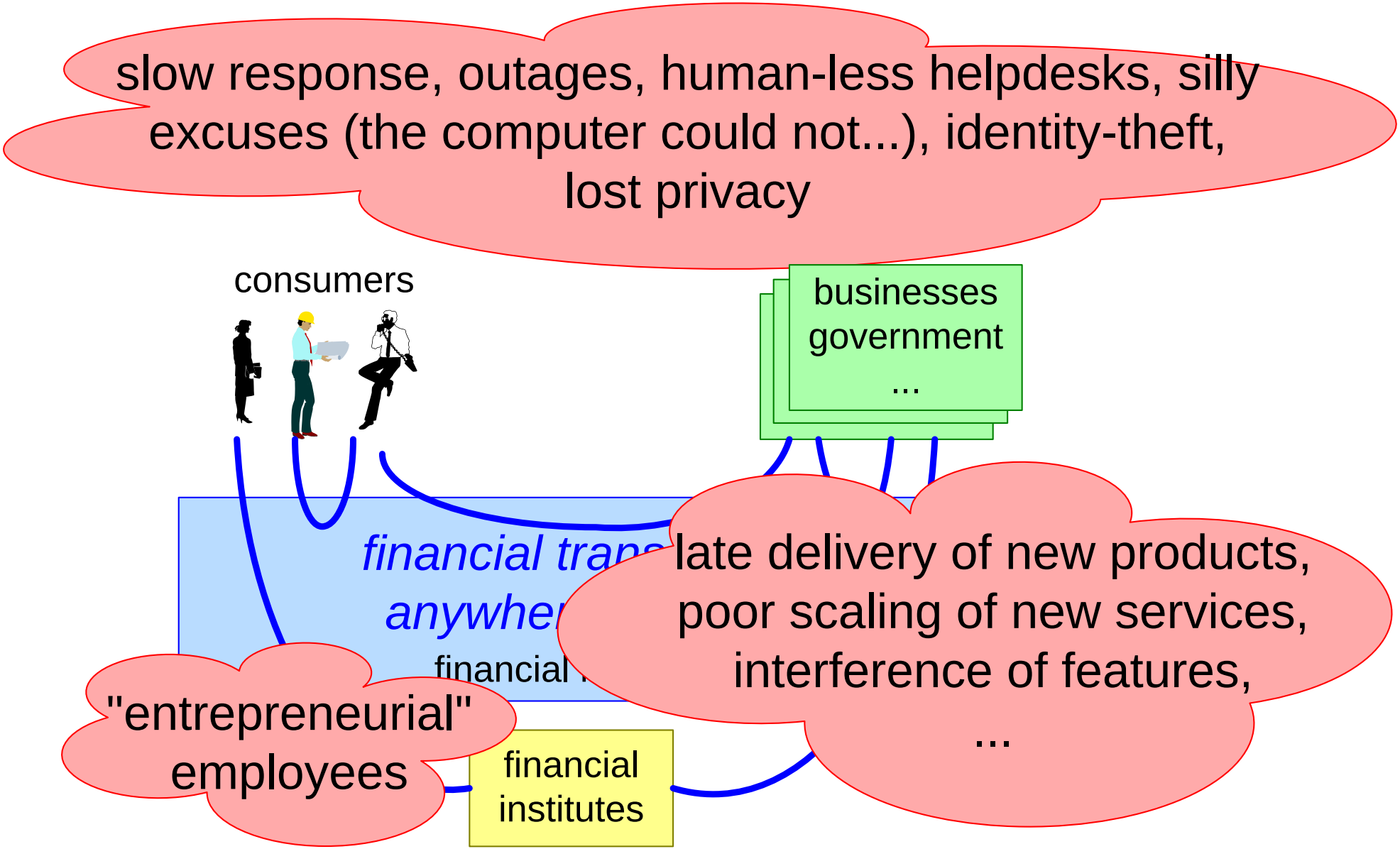
September 6, 2020
status: preliminary draft
version: 0



Functionality is Limitless



But Problems seem to be Pervasive



Do we Gain or do we Lose?

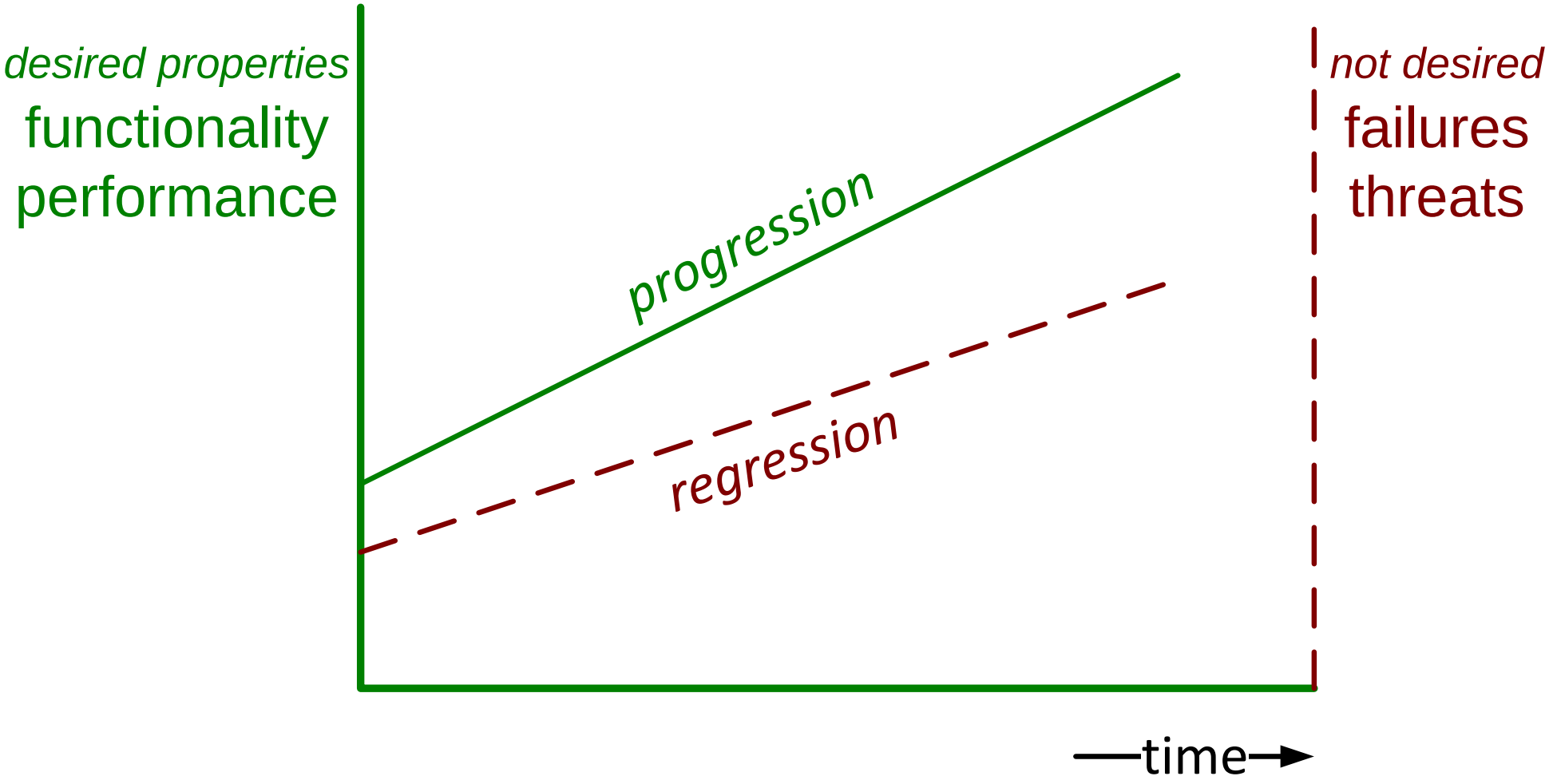
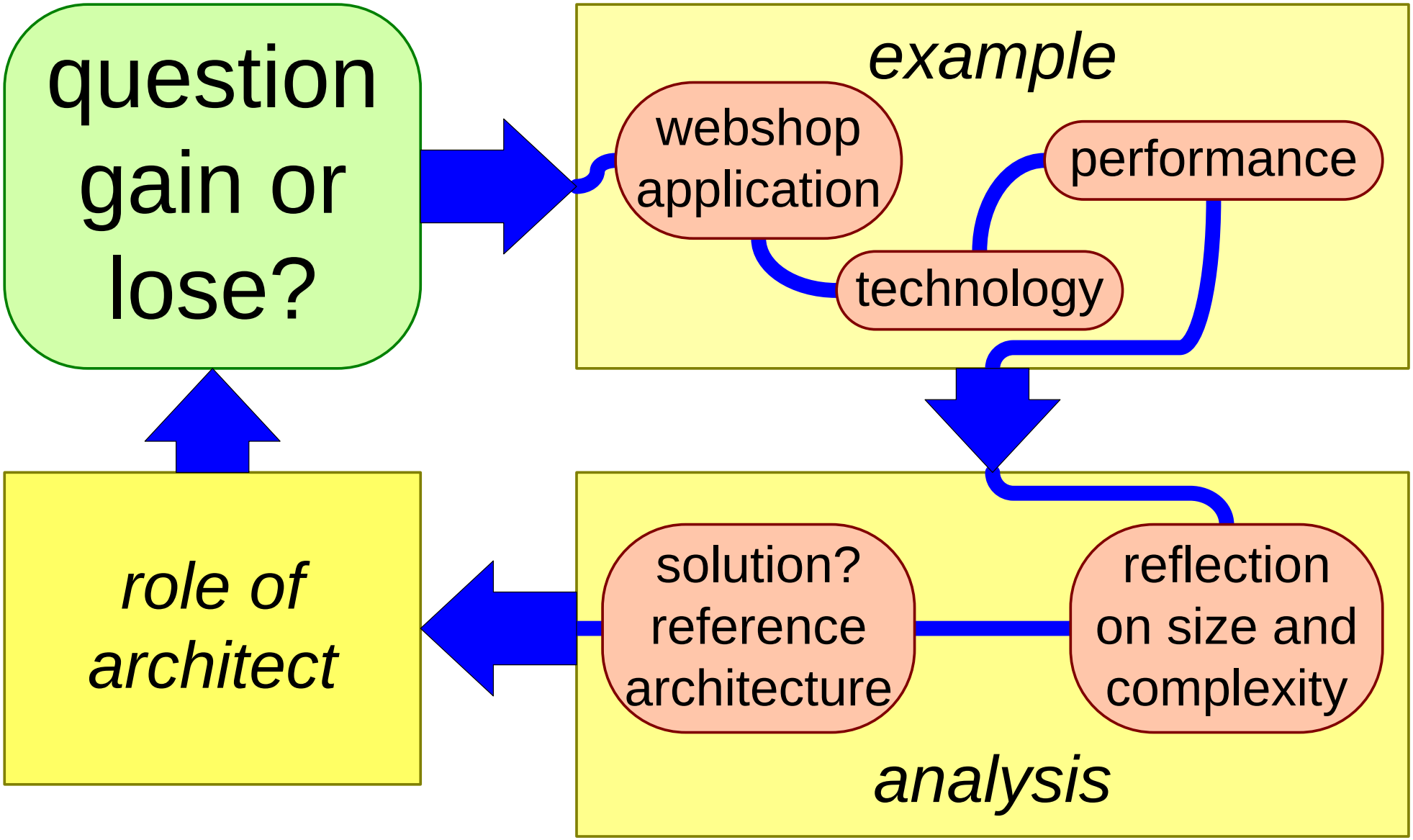
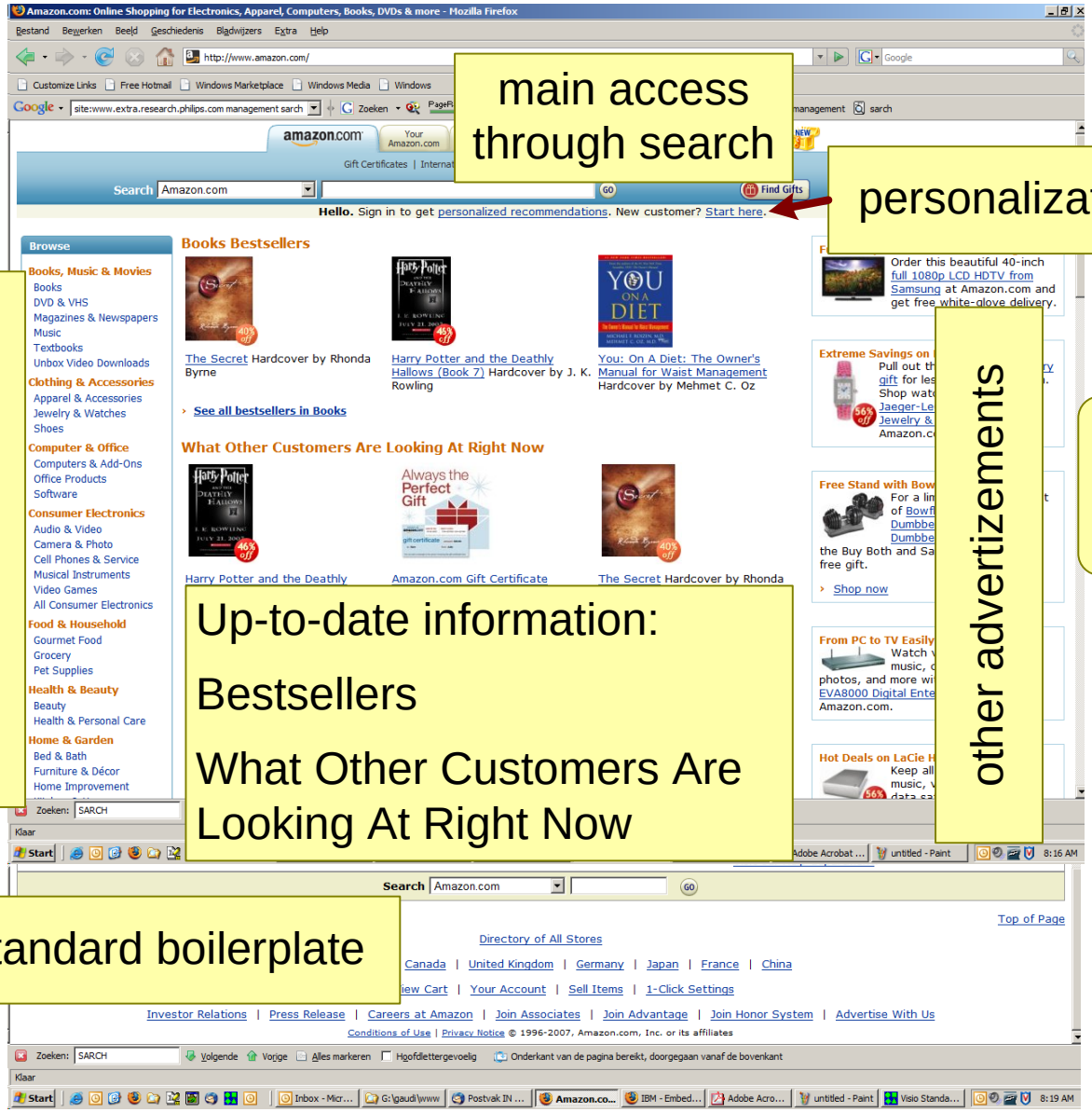


Figure Of Contents™

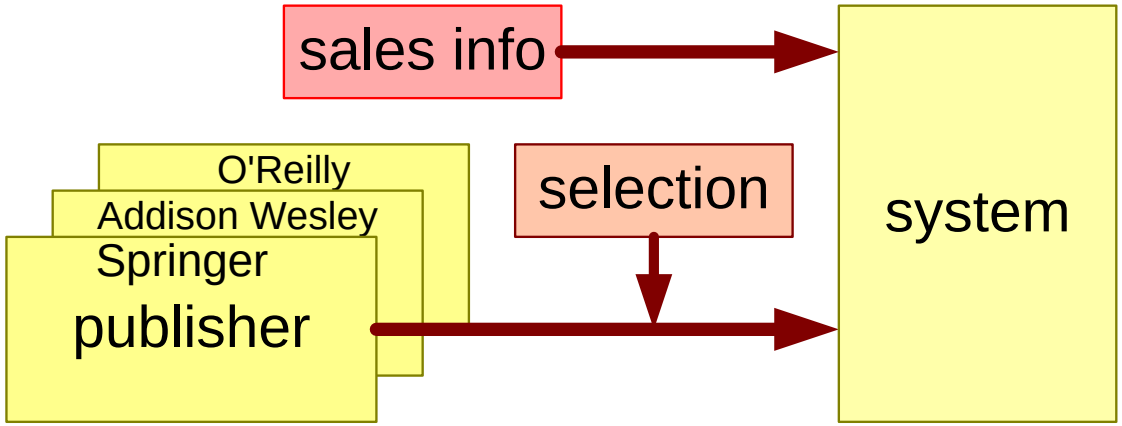


Example, Case Webshop



snapshot of www.amazon.com

Some Numbers: New Books per Year



product portfolio characteristics

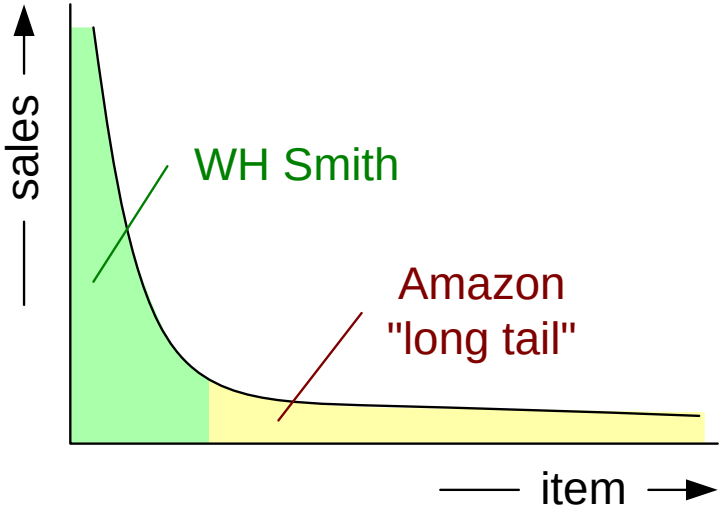
selection depends on business

life cycle changes determined by business characteristics

source: http://en.wikipedia.org/wiki/Long_tail

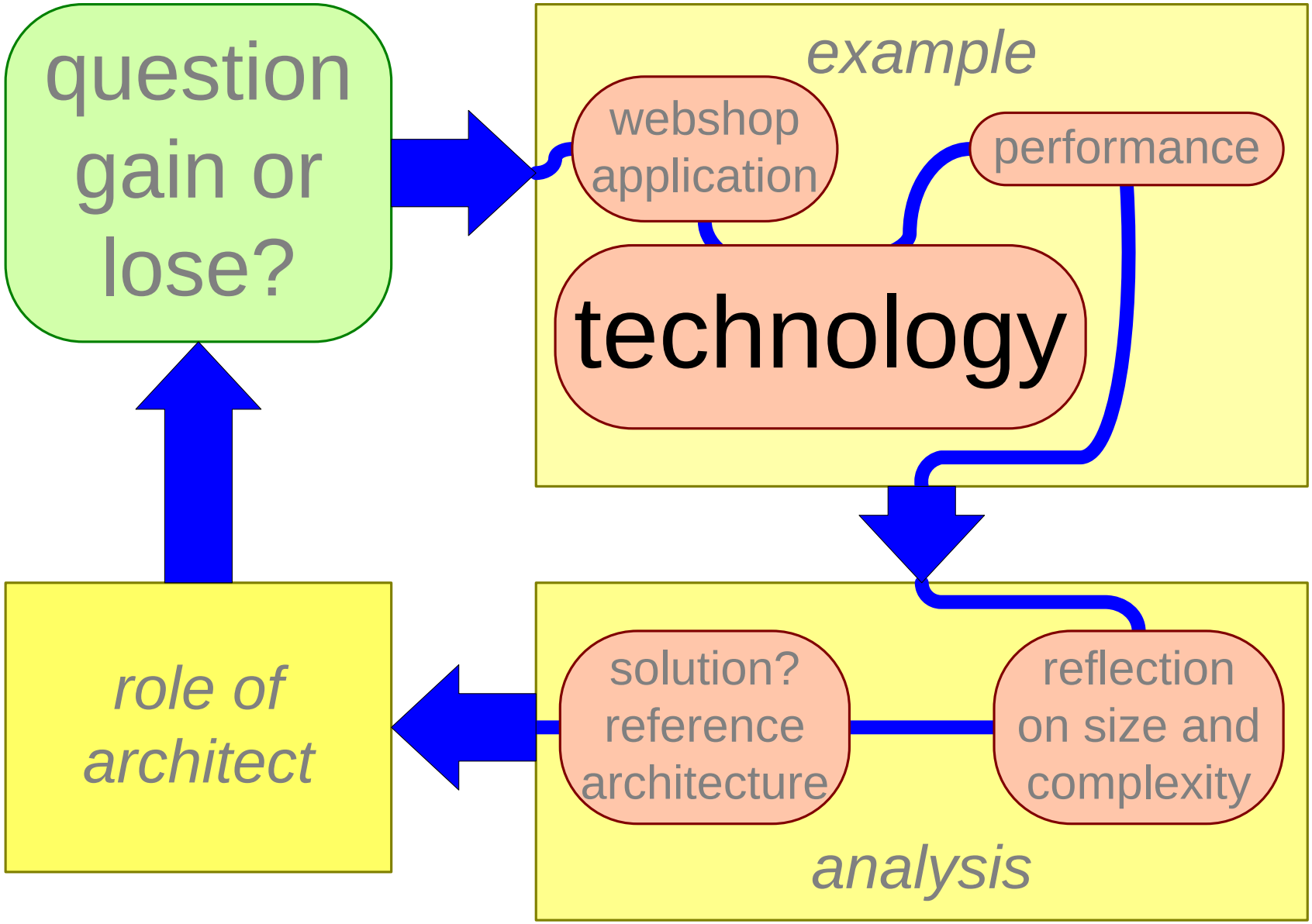
new books per year

UK (1)	206k (2005)	107k (1996)
USA(2)	172k (2005)	68k (1996)
China(3)		101k (1994)
India(21)		12k (1996)

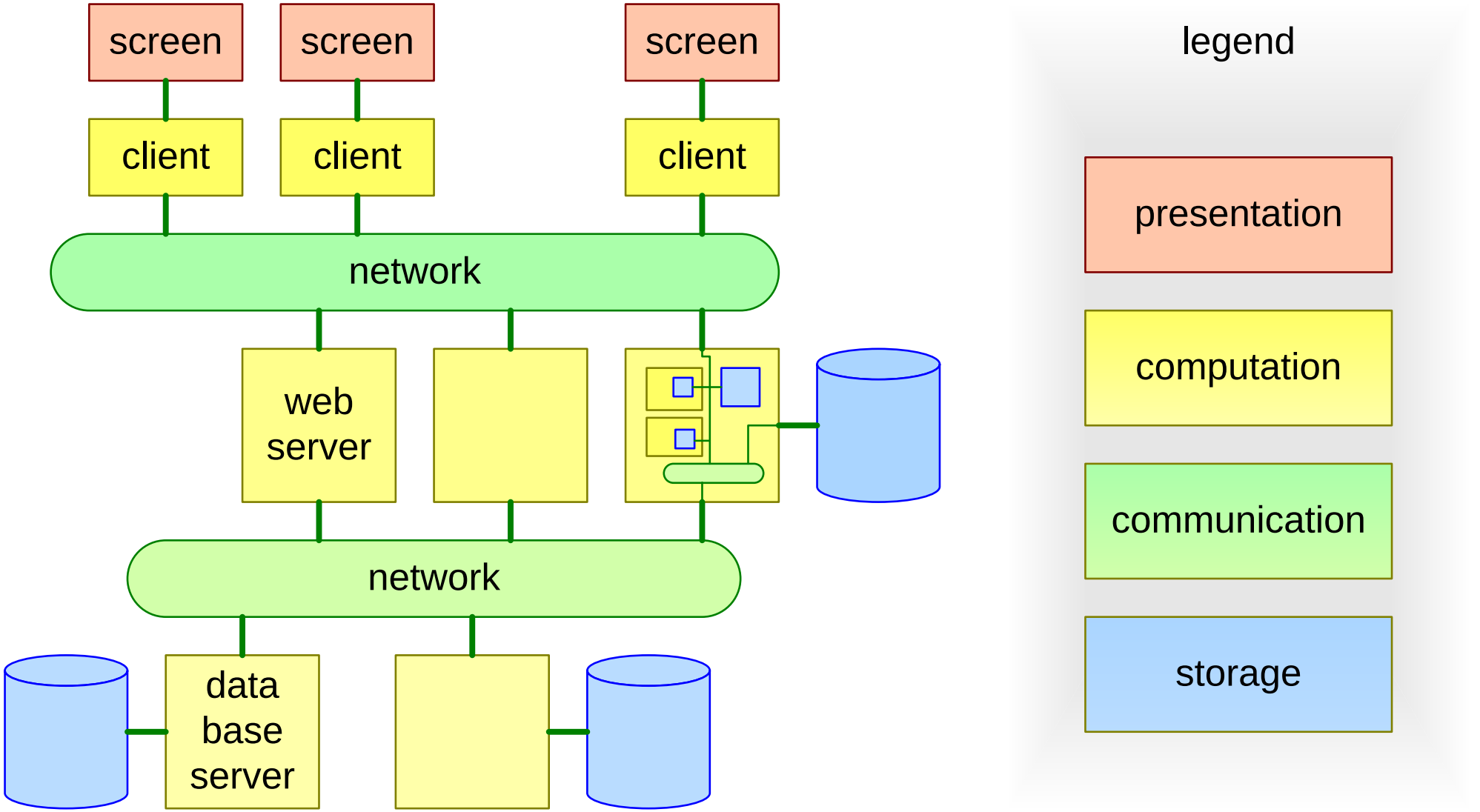


source: http://en.wikipedia.org/wiki/Books_published_per_country_per_year

Technology


question
gain or
lose?
example
webshop
application
performance
technology
role of
architect
solution?
reference
architecture
reflection
on size and
complexity
analysis

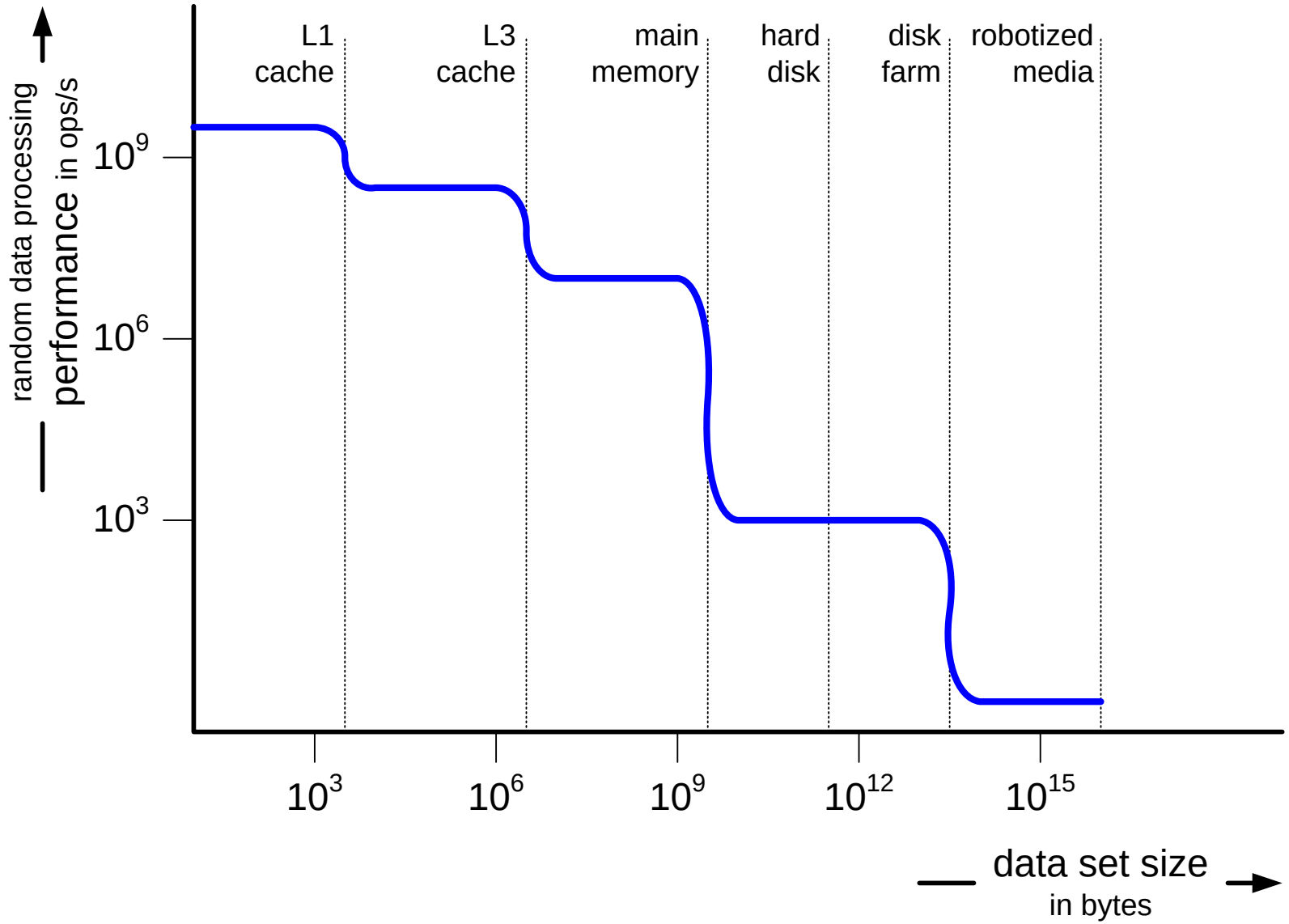
Typical Block Diagram and Typical Resources



Hierarchy of Storage Technology Figures of Merit

		latency	capacity
processor cache	*L1 cache*	sub ns	n kB
	L2 cache		
	L3 cache	ns	n MB
fast volatile	*main memory*	tens ns	n GB
persistent	*disks*		n*100 GB
	disk arrays	ms	
	disk farms		n*10 TB
archival	*robotized*		
	optical media	>s	n PB
	tape		

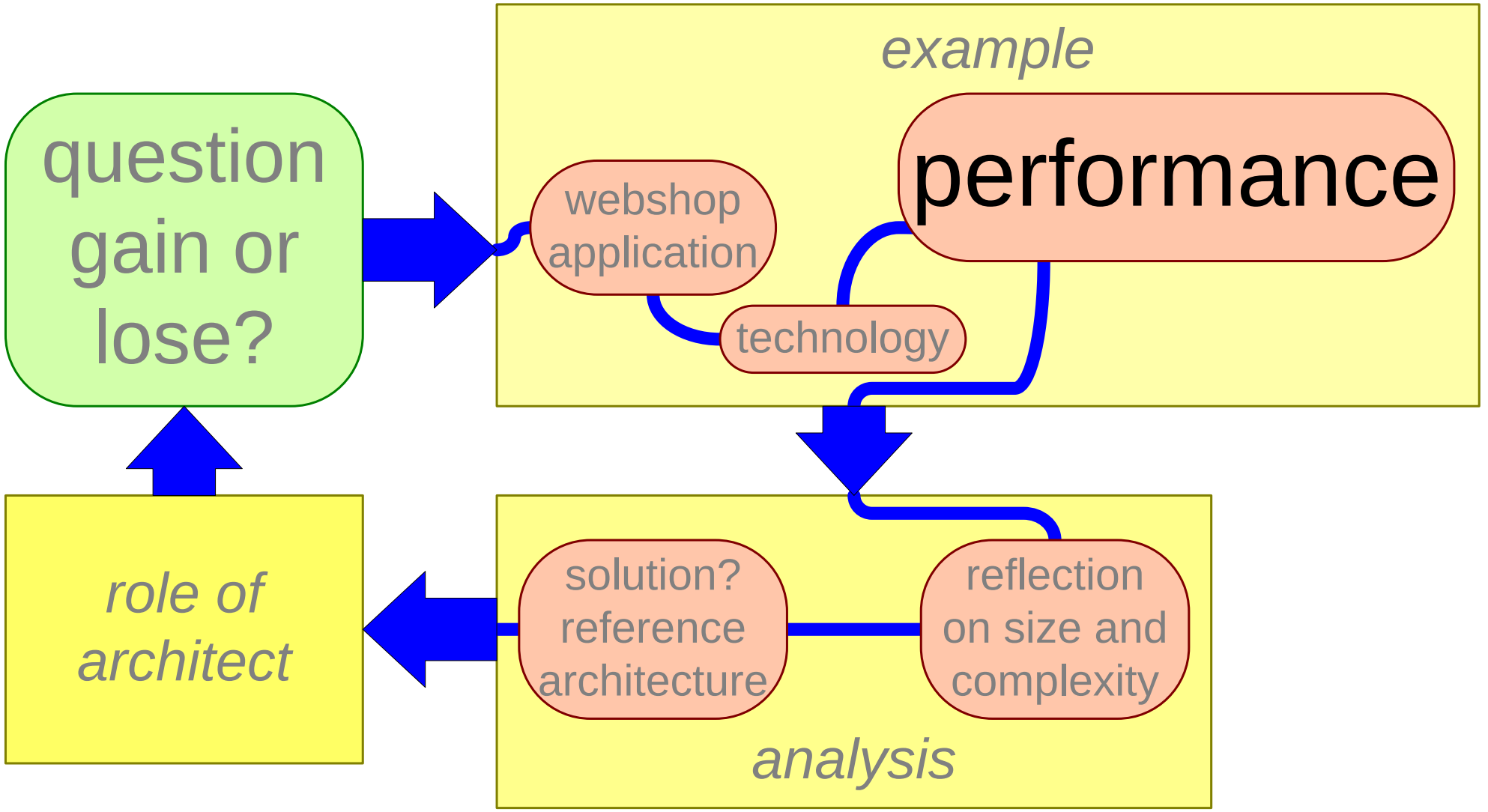
Performance as Function of Data Set Size



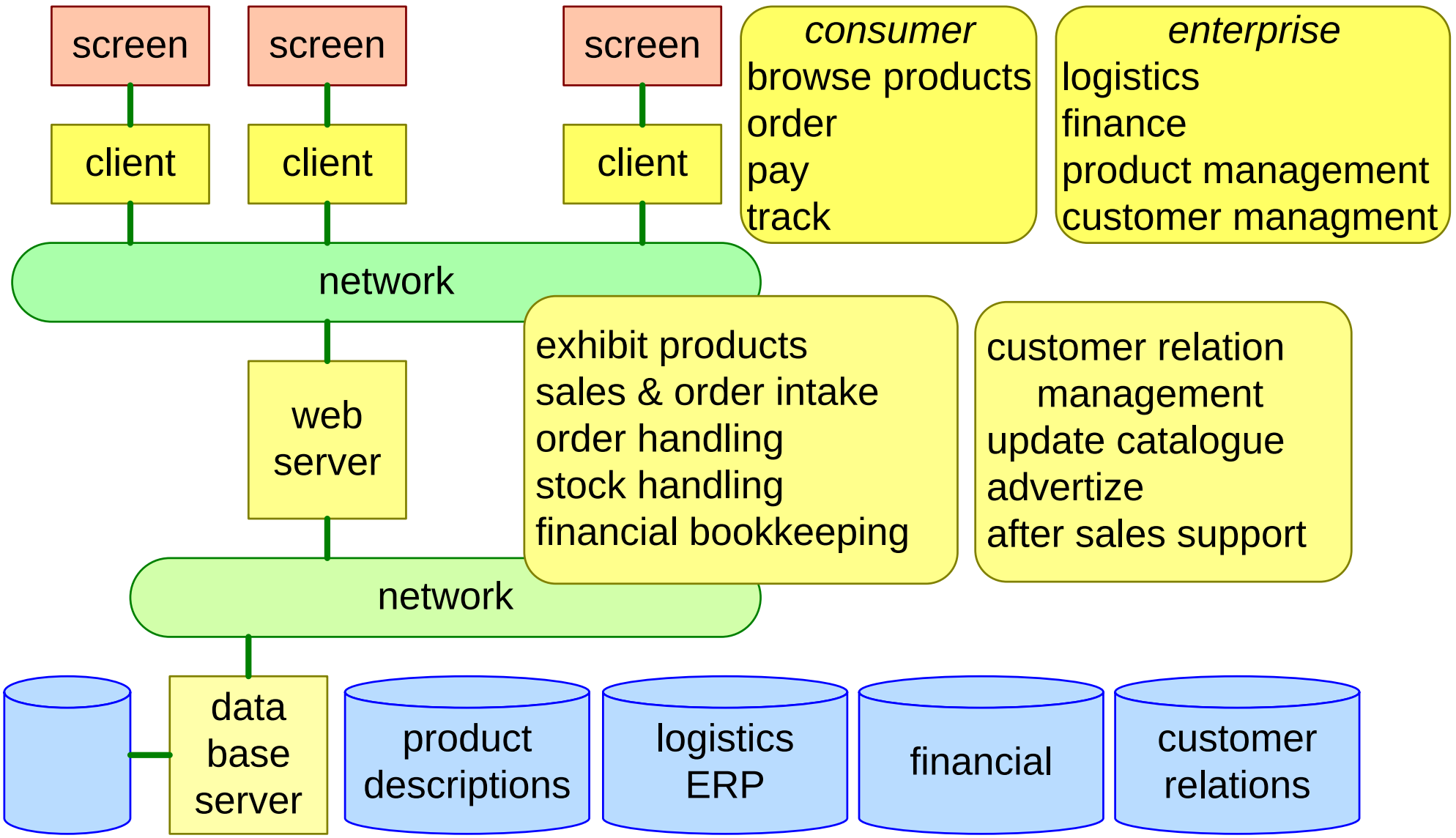
Communication Technology Figures of Merit

		latency	frequency	distance
on chip	*connection*	sub ns	n GHz	n mm
	network	n ns	n GHz	n mm
PCB level		tens ns	n 100MHz	n cm
Serial I/O		n ms	n 100MHz	n m
network	*LAN*	n ms	100MHz	n km
	WAN	n 10ms	n GHz	global

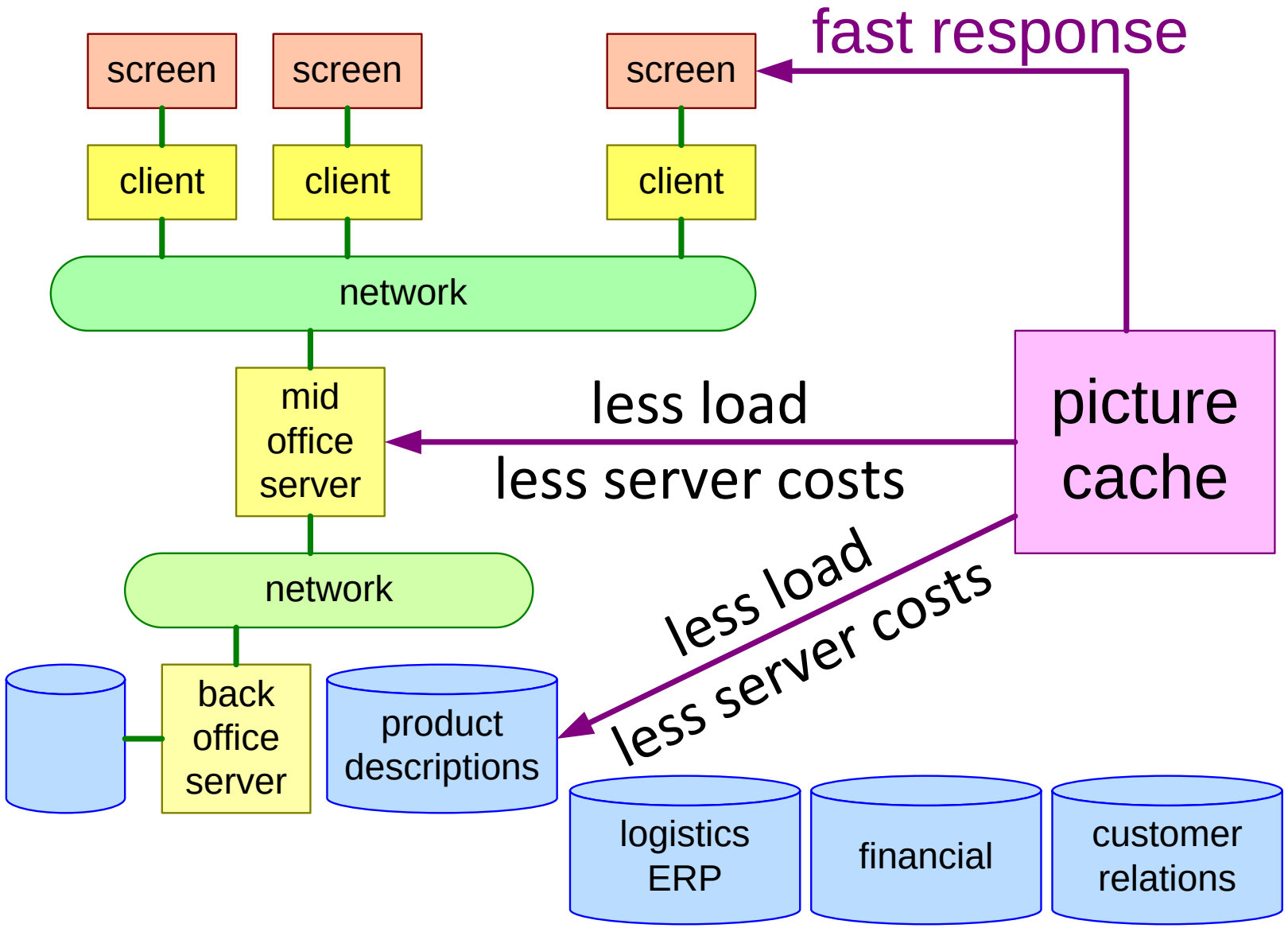
Performance



Example Web Shop



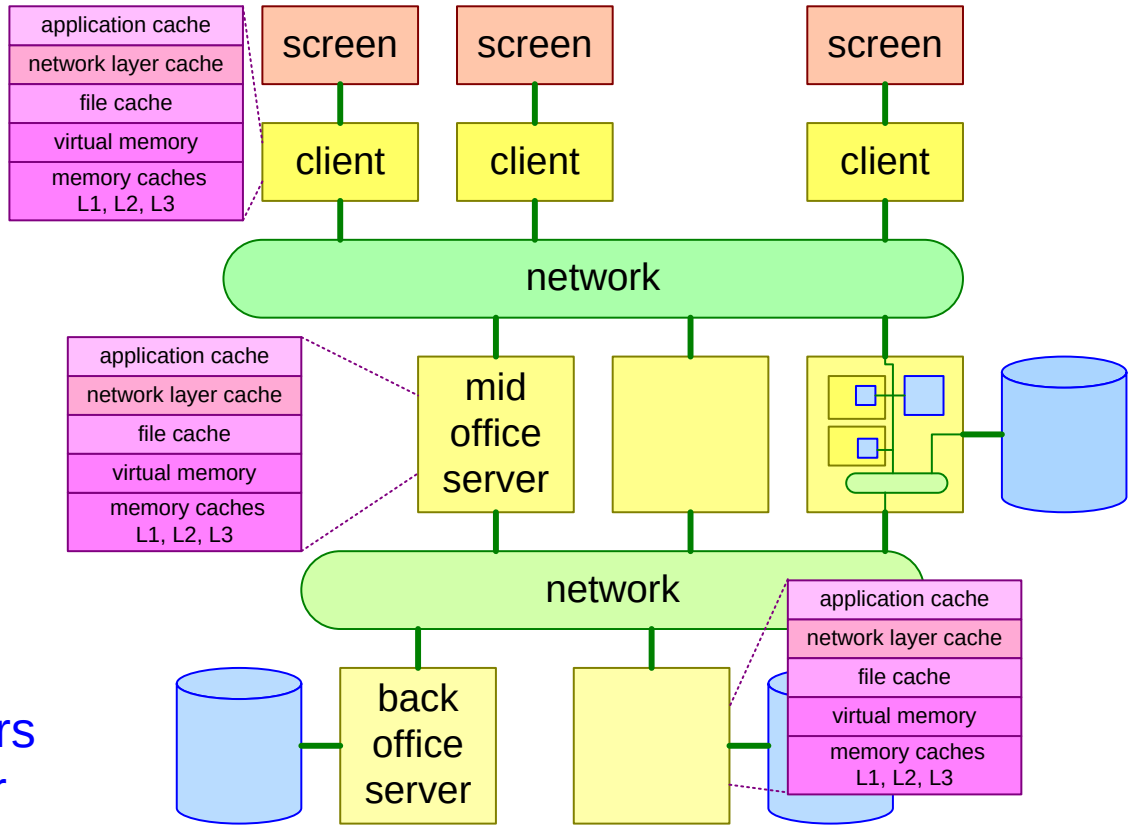
Impact of Picture Cache



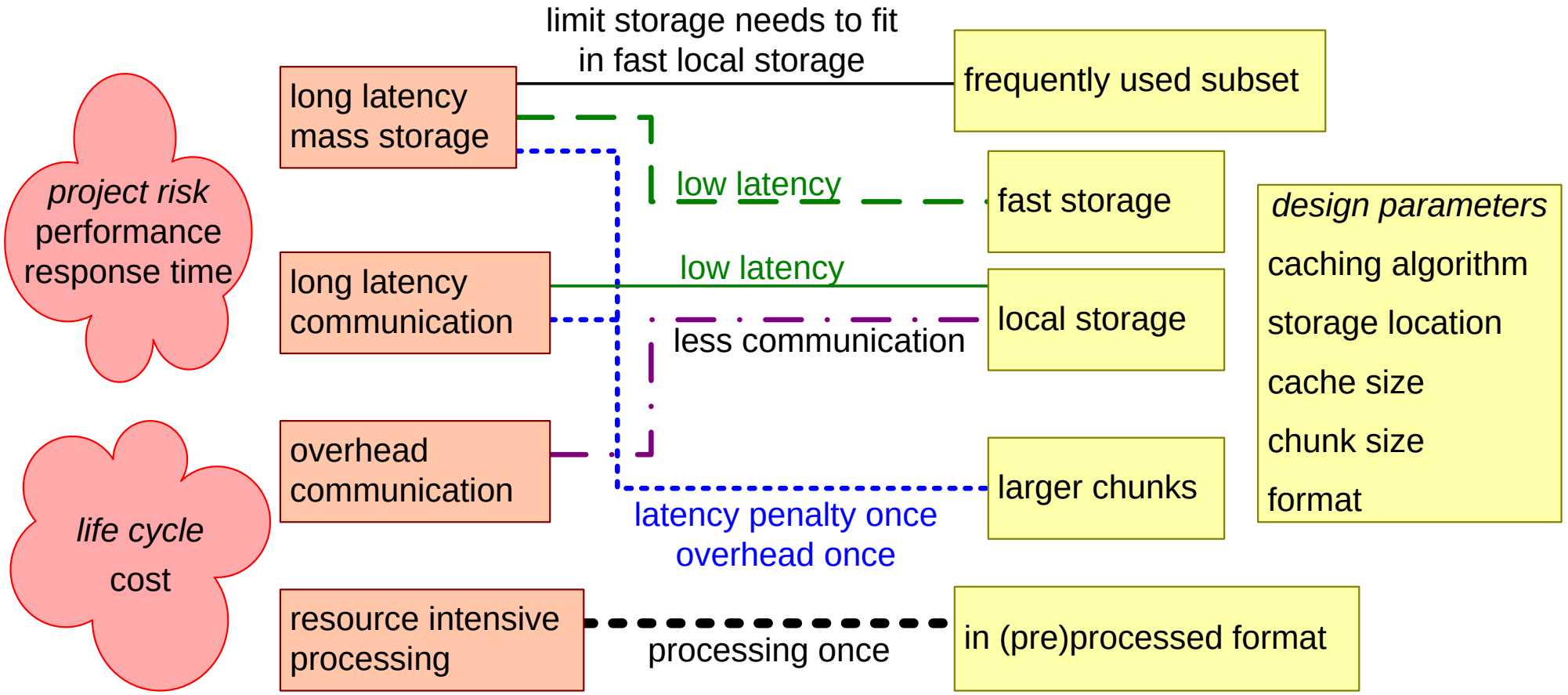
Multiple Layers of Caching

	cache miss penalty	cache hit performance
application cache	1 s	10 ms
network layer cache	100 ms	1 ms
file cache	10 ms	10 µs
virtual memory	1 ms	100 ns
memory caches L1, L2, L3	100 ns	1 ns

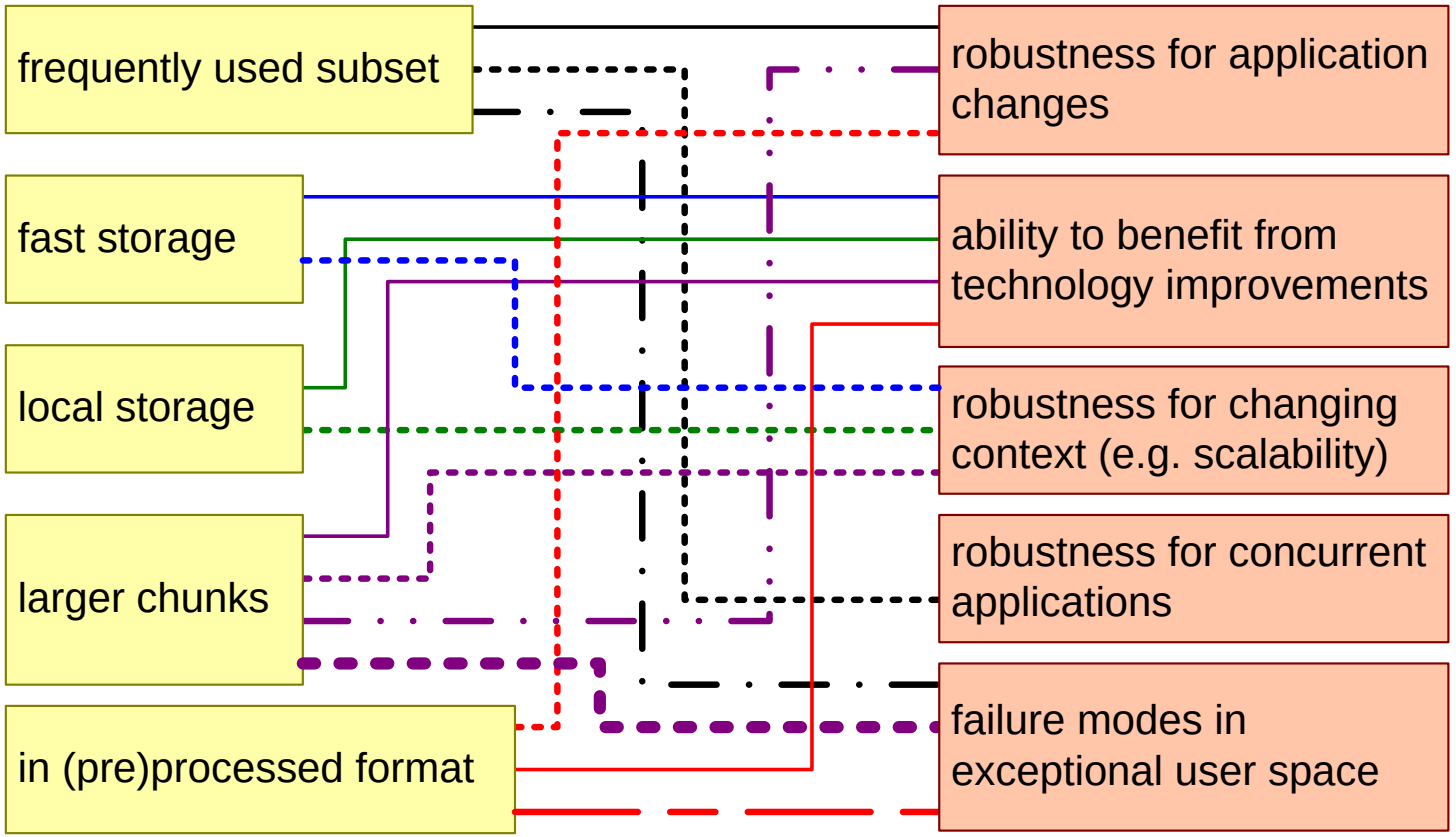
typical cache 2 orders of magnitude faster



Why Caching?


limit storage needs to fit
in fast local storage
long latency
mass storage
frequently used subset
low latency
fast storage
project risk
performance
response time
long latency
communication
low latency
local storage
less communication
design parameters
caching algorithm
storage location
cache size
chunk size
format
overhead
communication
larger chunks
latency penalty once
overhead once
life cycle
cost
resource intensive
processing
processing once
in (pre)processed format

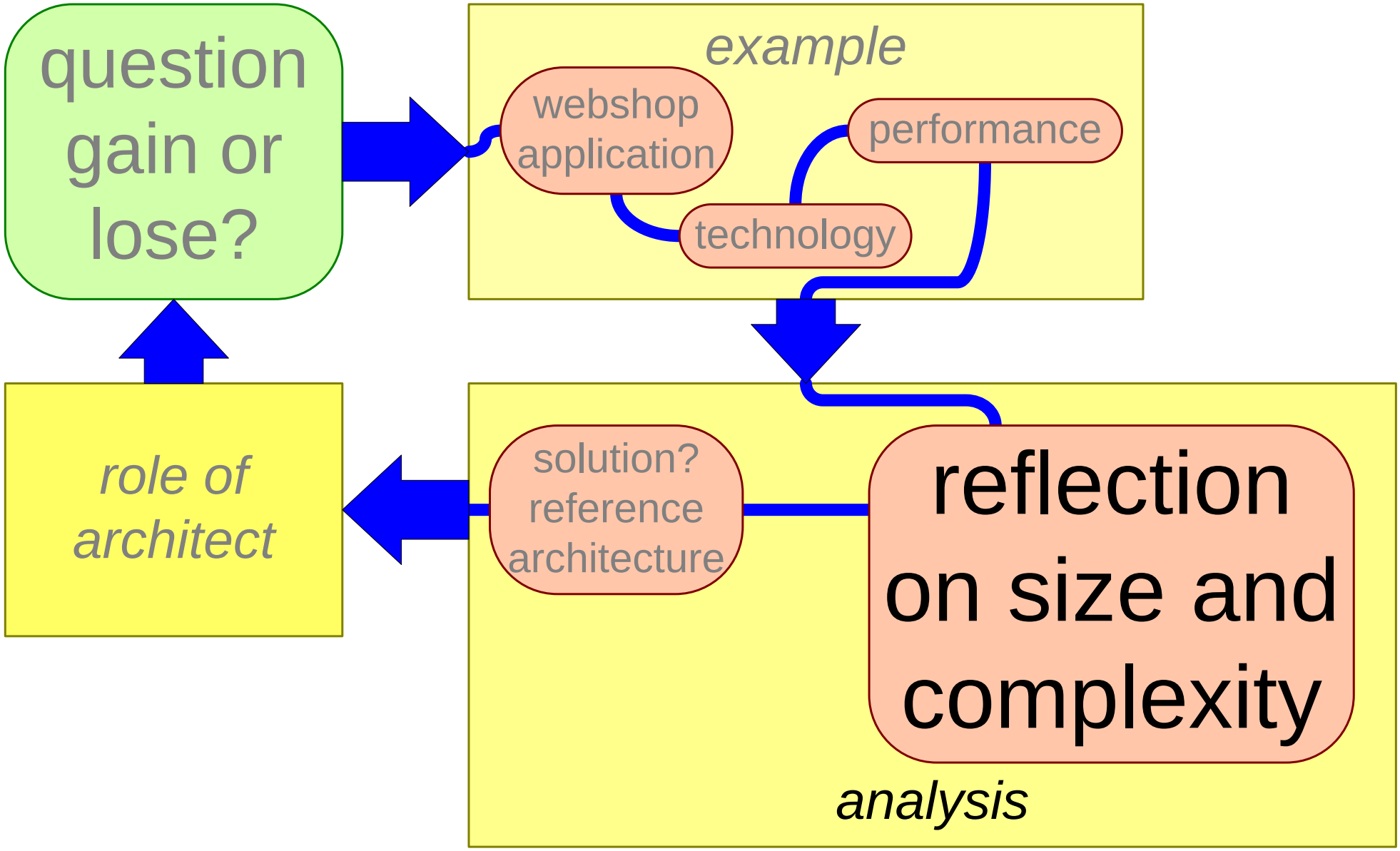
Risks of Caching



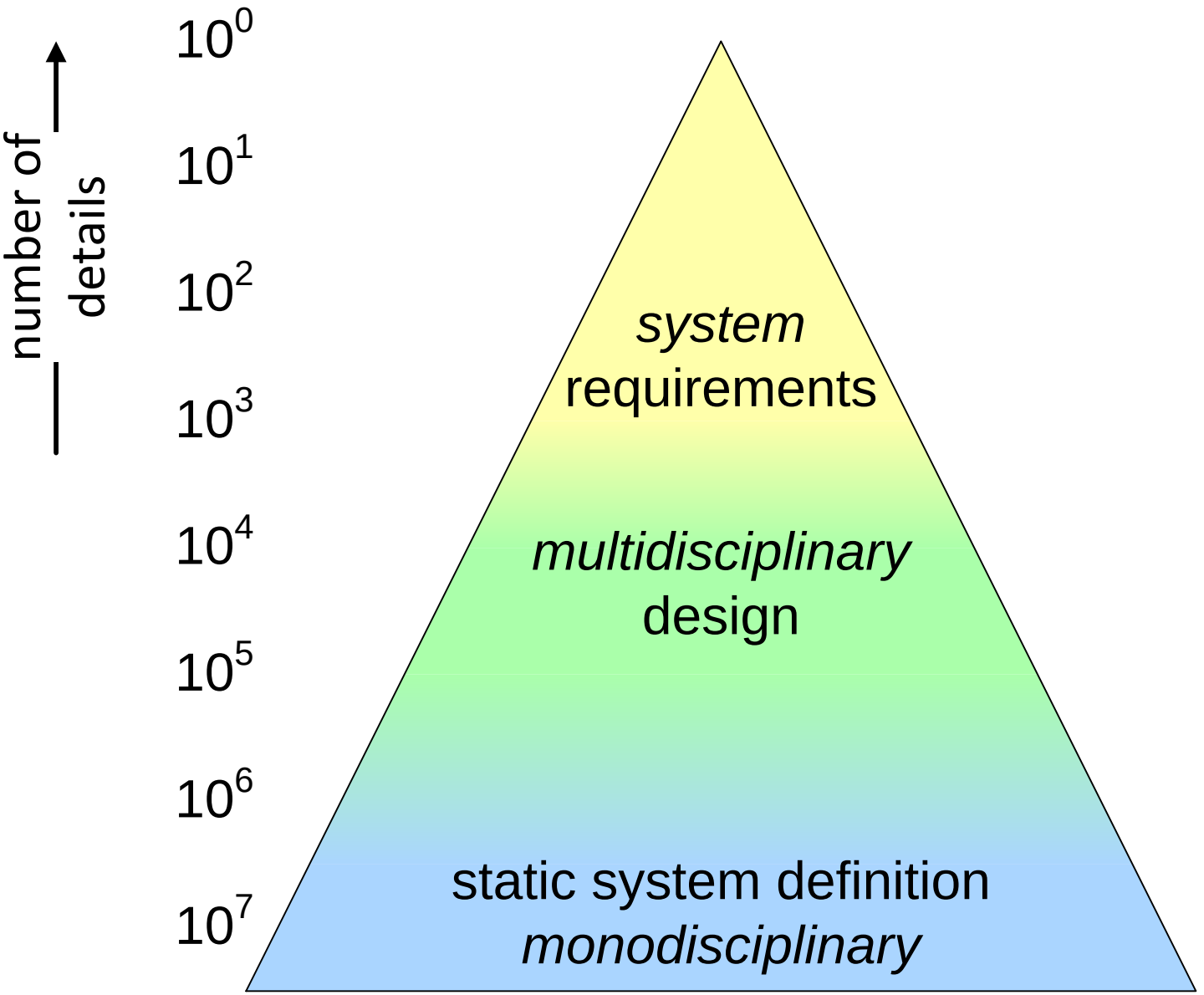
life cycle
cost
effort

project risk
cost
effort
performance

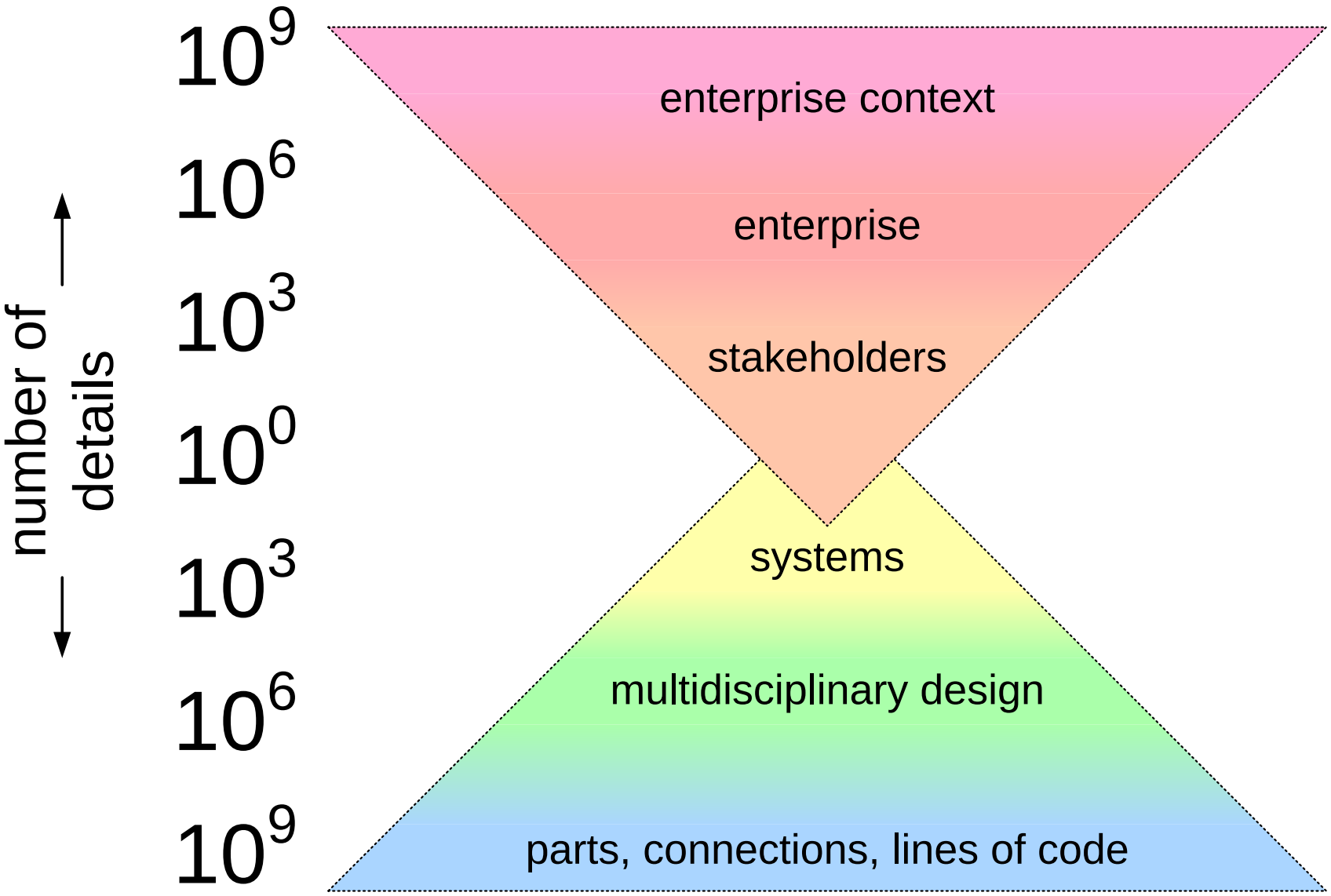
Size and Complexity



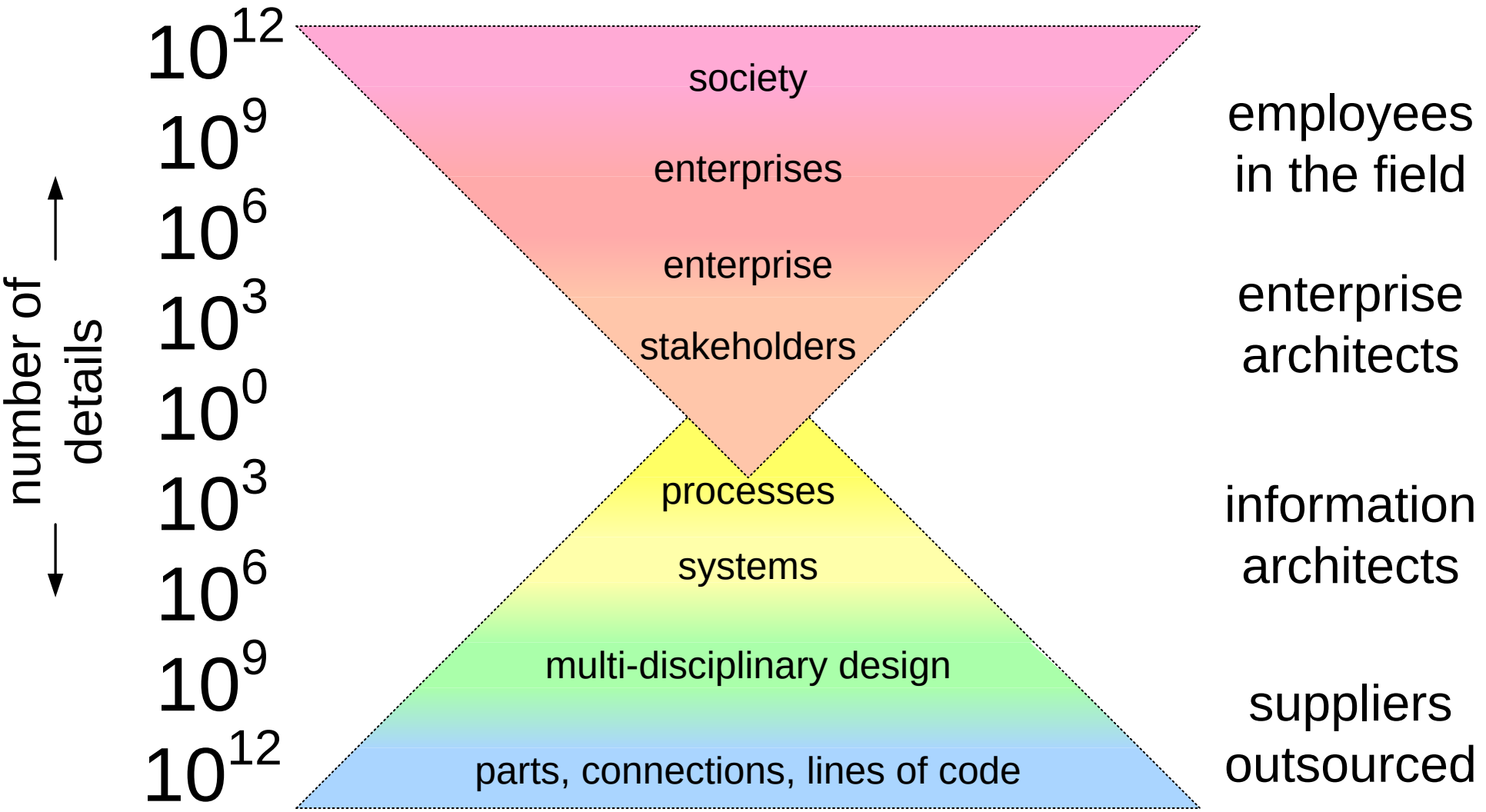
Level of Abstraction Single System



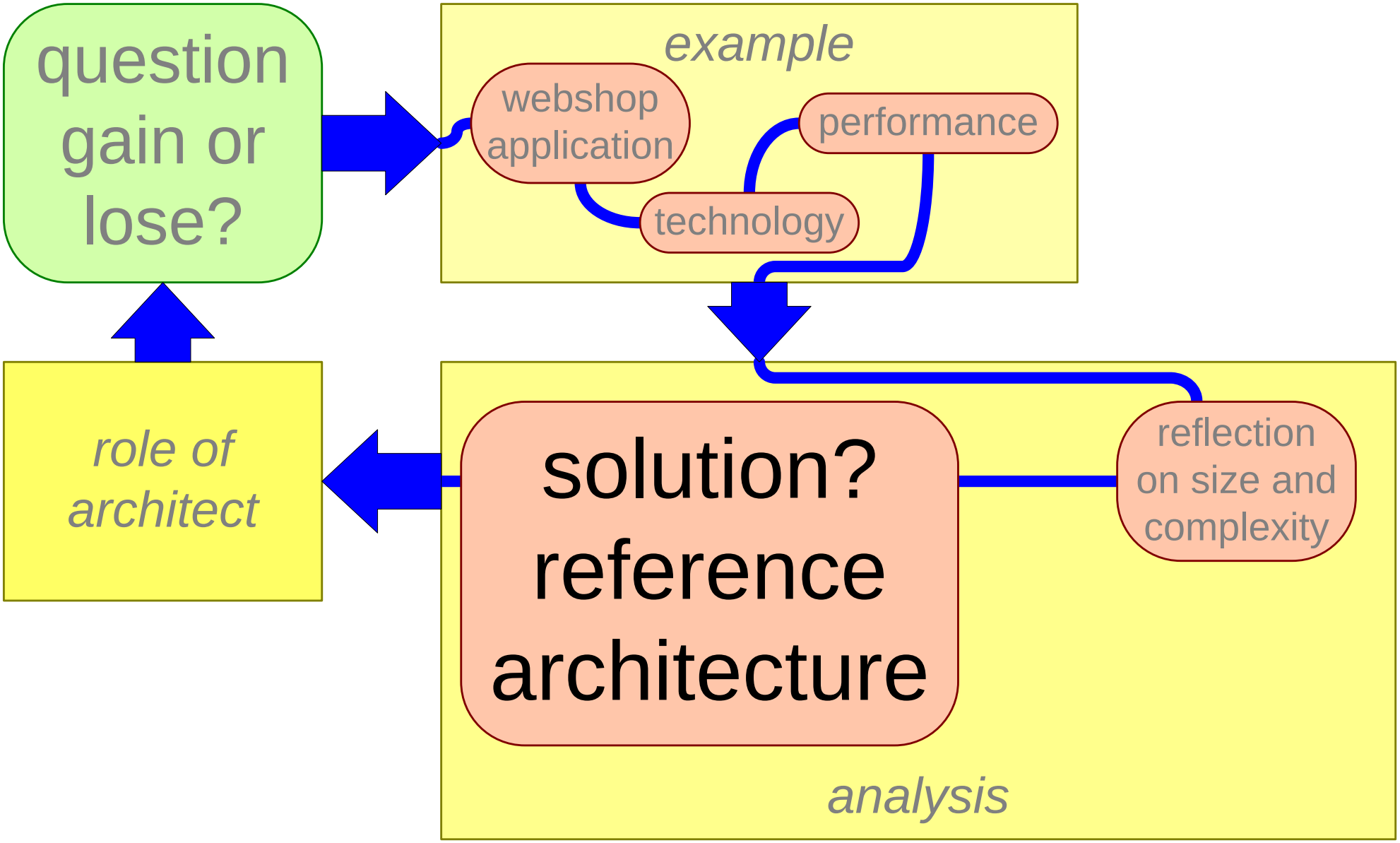
Product Family in Context



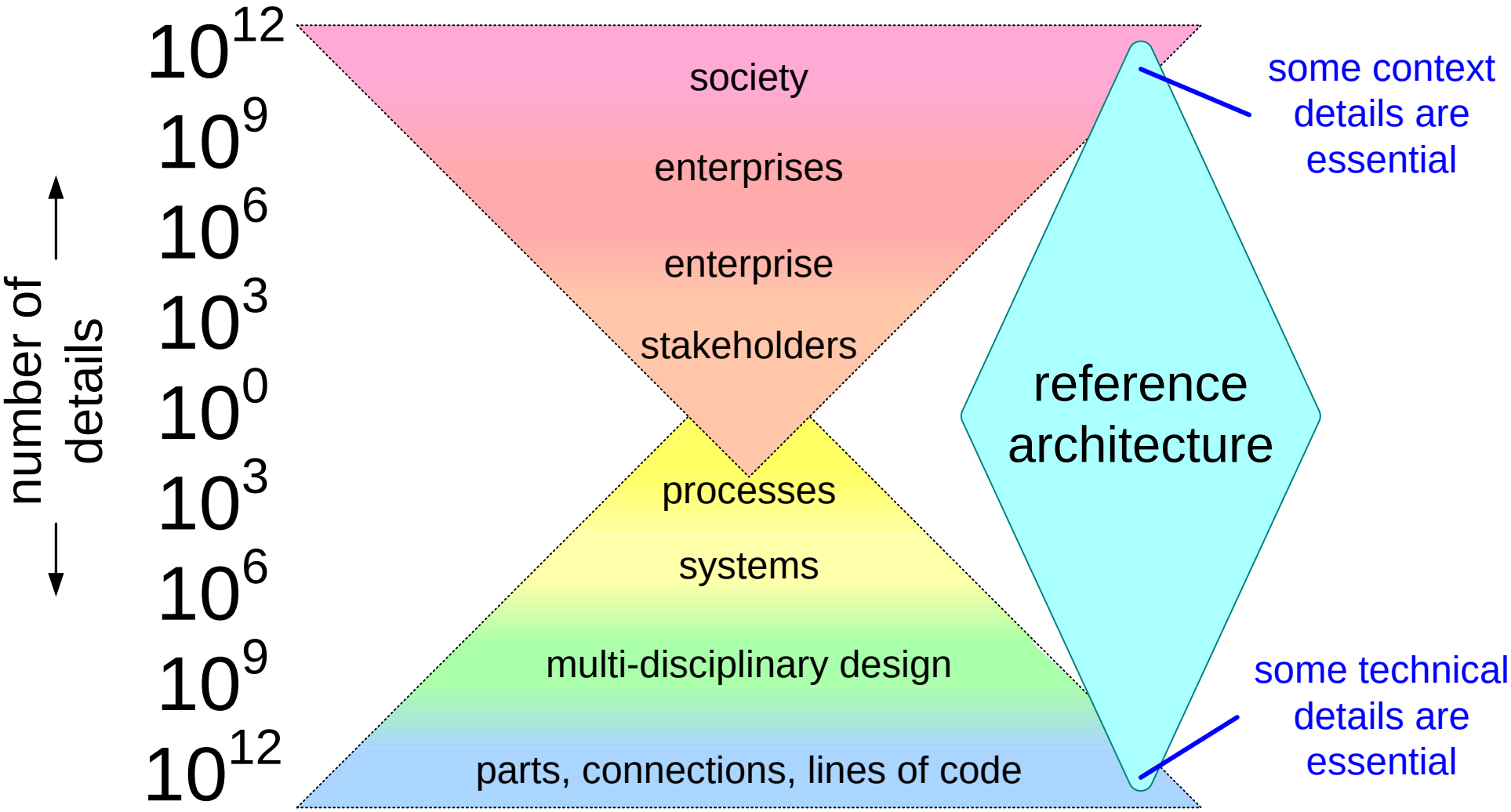
Number of Details in Today's Services



Reference Architecture



Reference Architecture as Solution?



Guidance from SAF Best Practices

1.1 One of several prerequisites for architecture creative synthesis is the definition of **5-7 specific key drivers** that are critical for success, along with the rationale behind the selection of these items

2.1. The essence of a system can be captured in about **10 models/views**

2.2. A **diversity** of architecture descriptions and models is needed: languages, schemata and the degree of formalism.

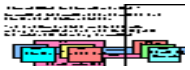
2.3. The level of **formality** increases as we move closer to the implementation level.

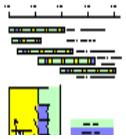
from http://www.architectingforum.org/bestpractices.shtml

Possible useful visualizations


COVmotorwayManagementKeyDrivers

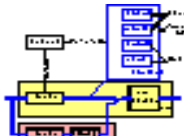

LWAvalueChain

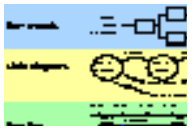

COVsuppliers


AVdynamicsURF


AVstakeholders


AVcontextMotorwayManagement


AVsimpleTVmodel


AVdynamicModels

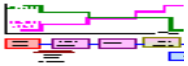

AVcostBenefitModels

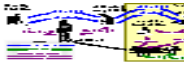

SHTexampleStoryLayout


ETexampleTimeShiftingWhatIf


MICAFtypicalCase


MICAFtypicalTiming


MICAFclinicalInfoFlow

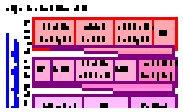

MICAFrequestFlow


MICAFfinancialContext

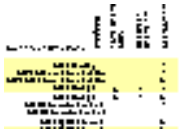

MICAFsystemLayers


MICAFreferenceModel

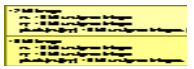

MICAFmarketSegmentation

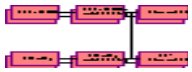

MICAFinformationLayers


FVcommercialTree


FVfeatureMatrix


FVinformationModel


FVdatamodel


CVfunctionalDecomposition


CVconstructionDecomposition

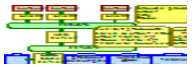

CVinformationModel

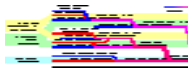

CVprocessDecomposition


CVreconstructionPerformanceModel

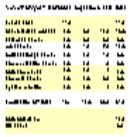

CVstartUp


CVworkBreakdown

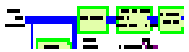

MAFTexampleWebShop


CVintegrationPlan

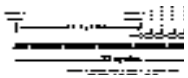

RVperformanceCostEffort

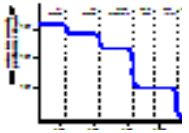

RVmemoryBudgetTable


ASMLoverlayBudget


MICVpresentationPipeline

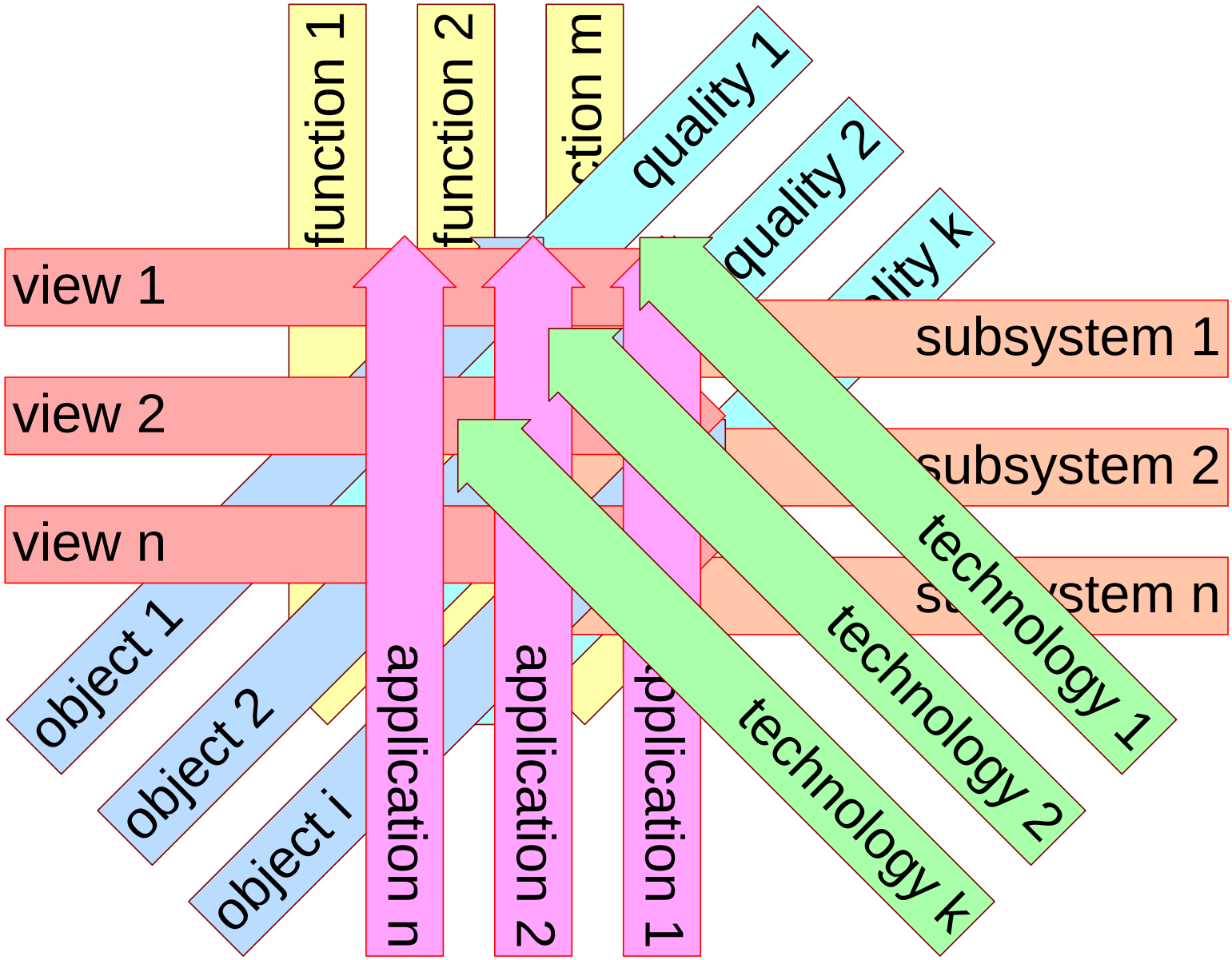

FFTSstandardInteractiveSystemAnnotated


EBMImemoryTimingARM


MAFTstoragePerformance

actual figures and references to their use at http://www.gaudisite.nl/figures/<name>.html

Ideal Structure does not exist

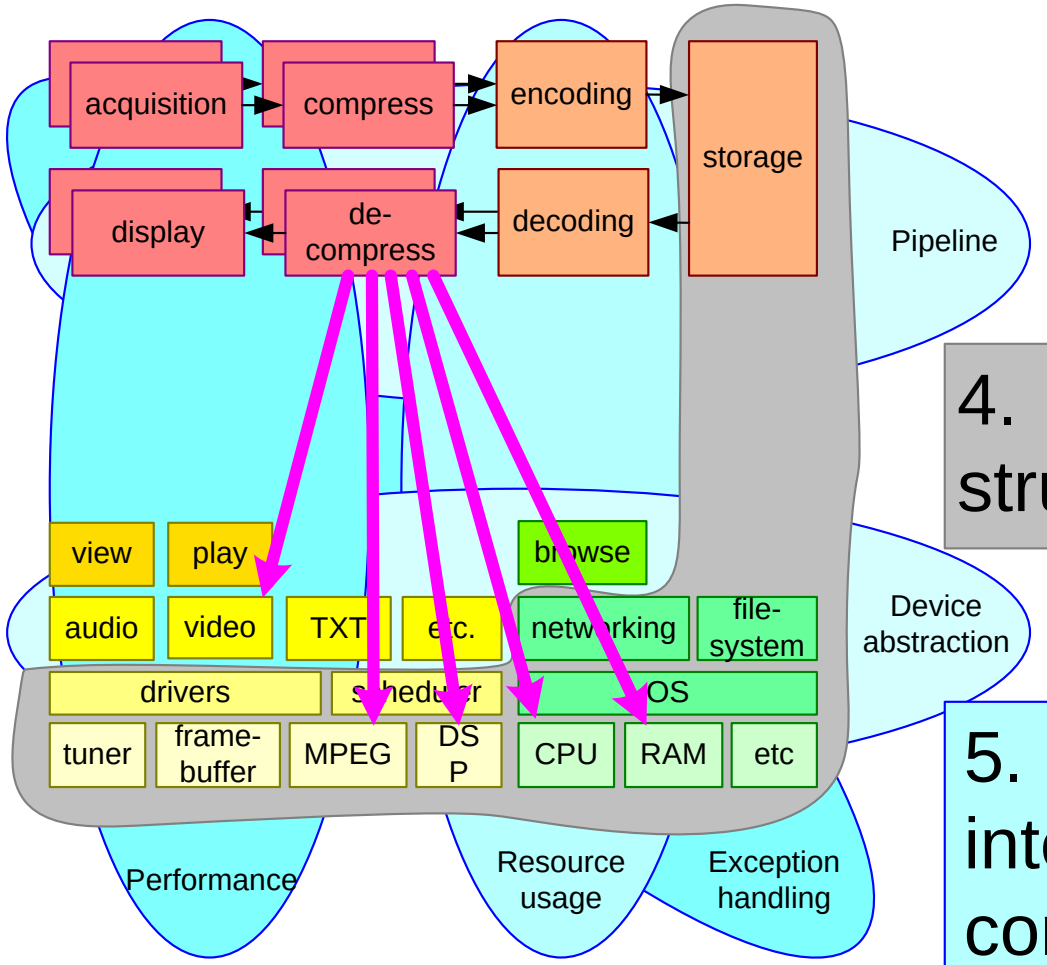


Synthesis, Integration, Relation oriented

1. Functional Decomposition

3. Allocation

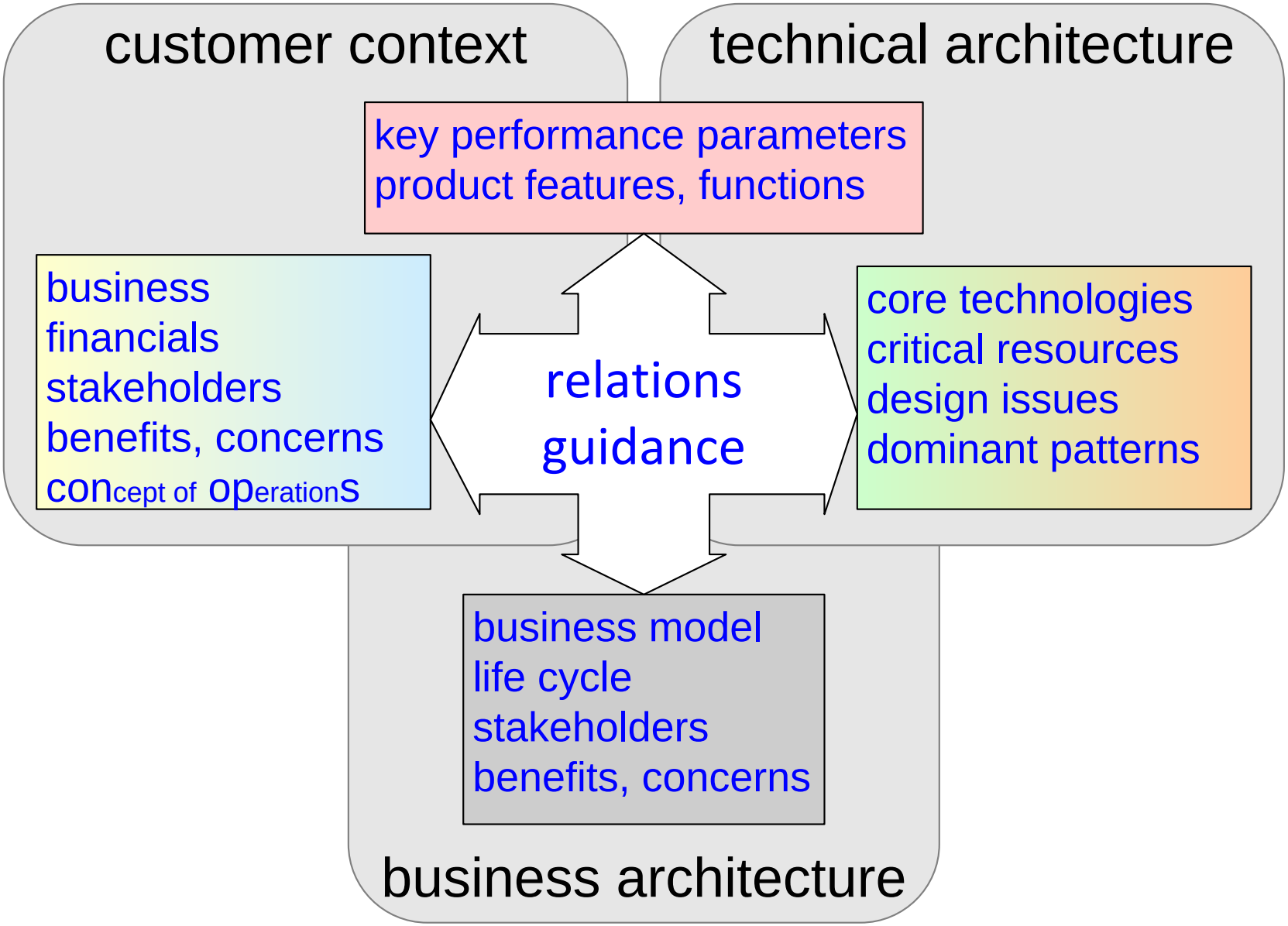
2. Construction Decomposition



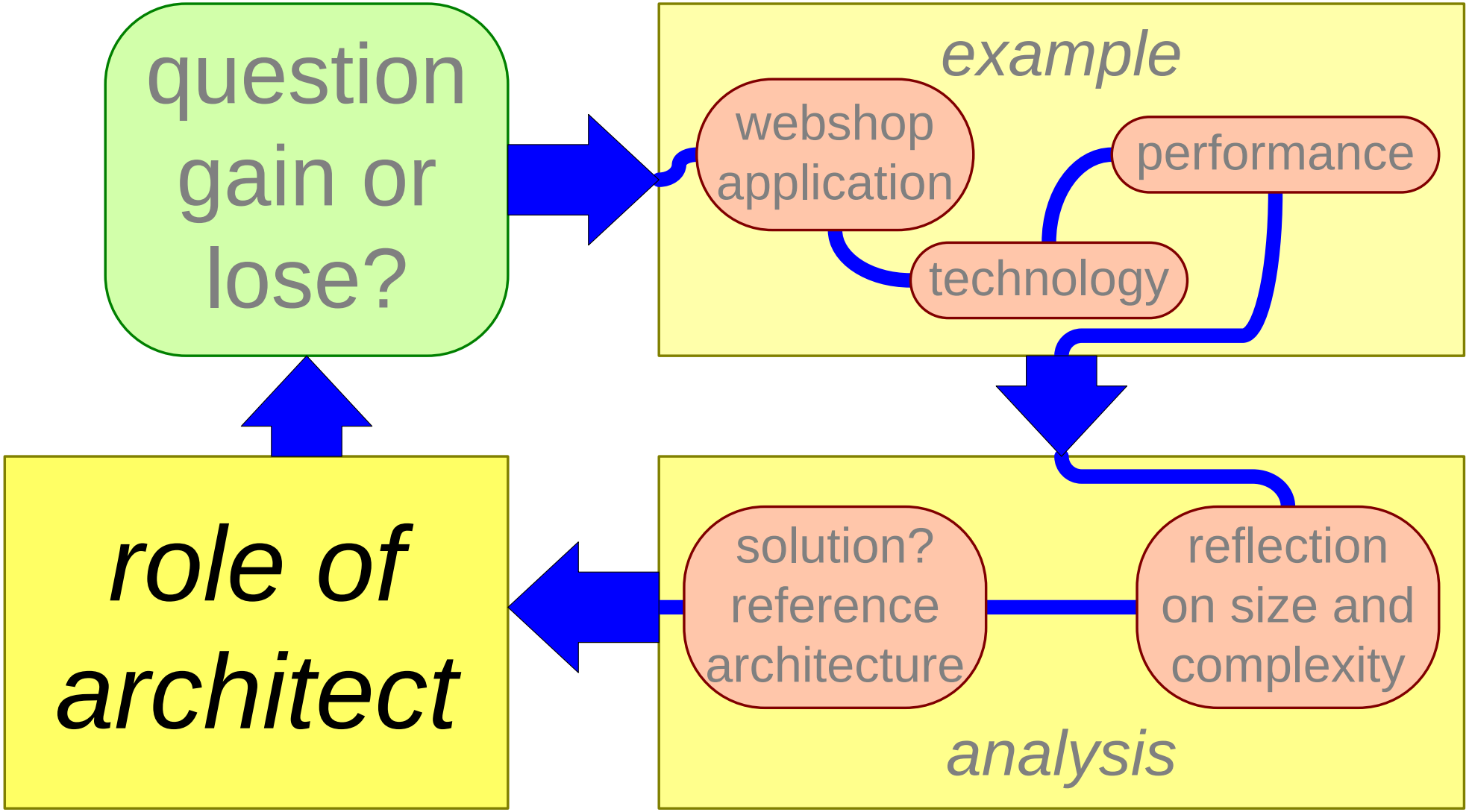
4. Infra-structure

5. Choice of integrating concepts

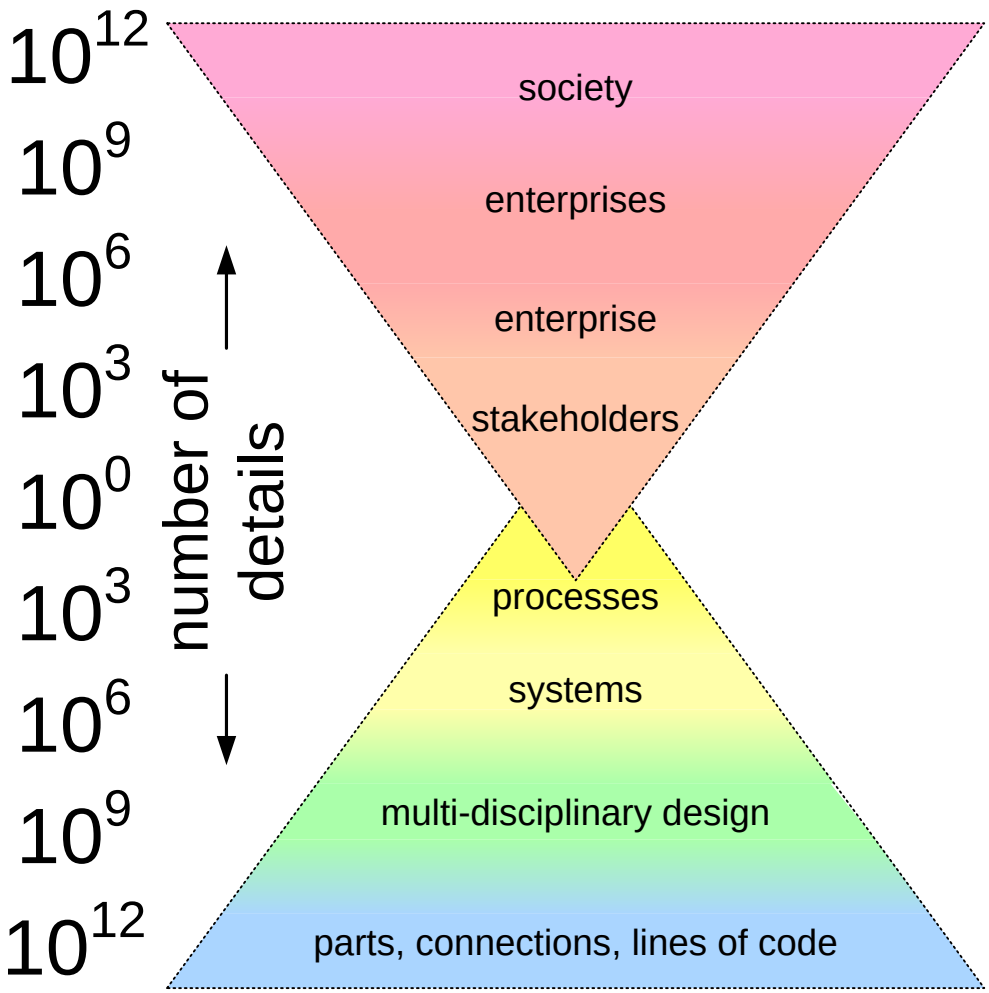
Checklist for RA content

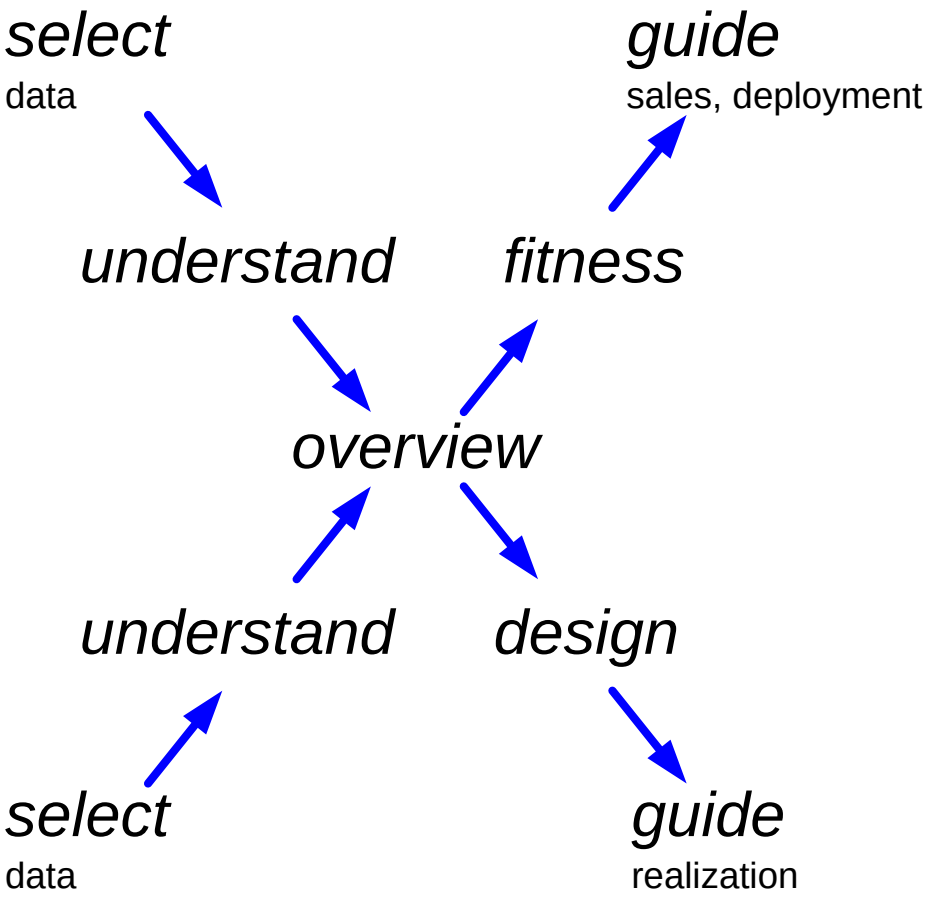


Role of Architect

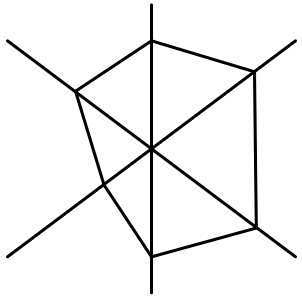


Tasks of Architect

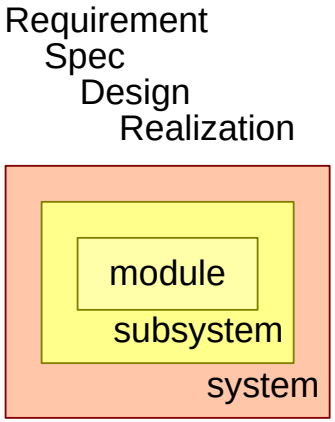




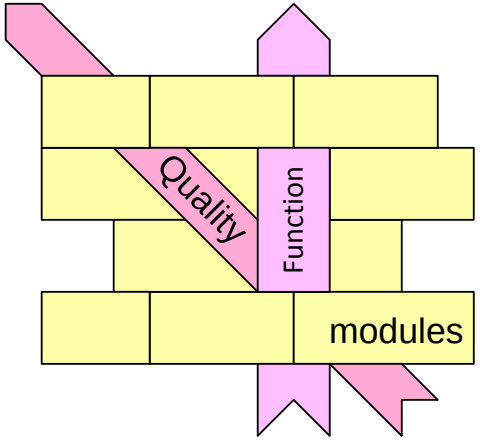
Responsibilities



Balance

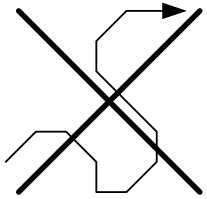


Consistency



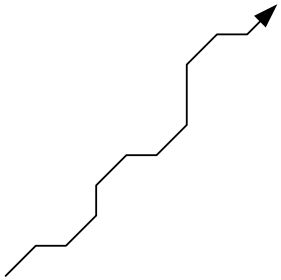
Decomposition
Integration

Overview

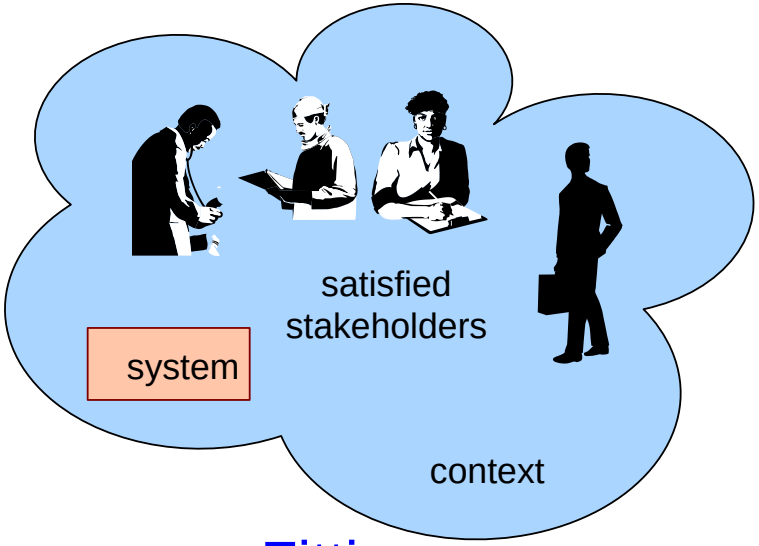


KISS

Elegance
Simple

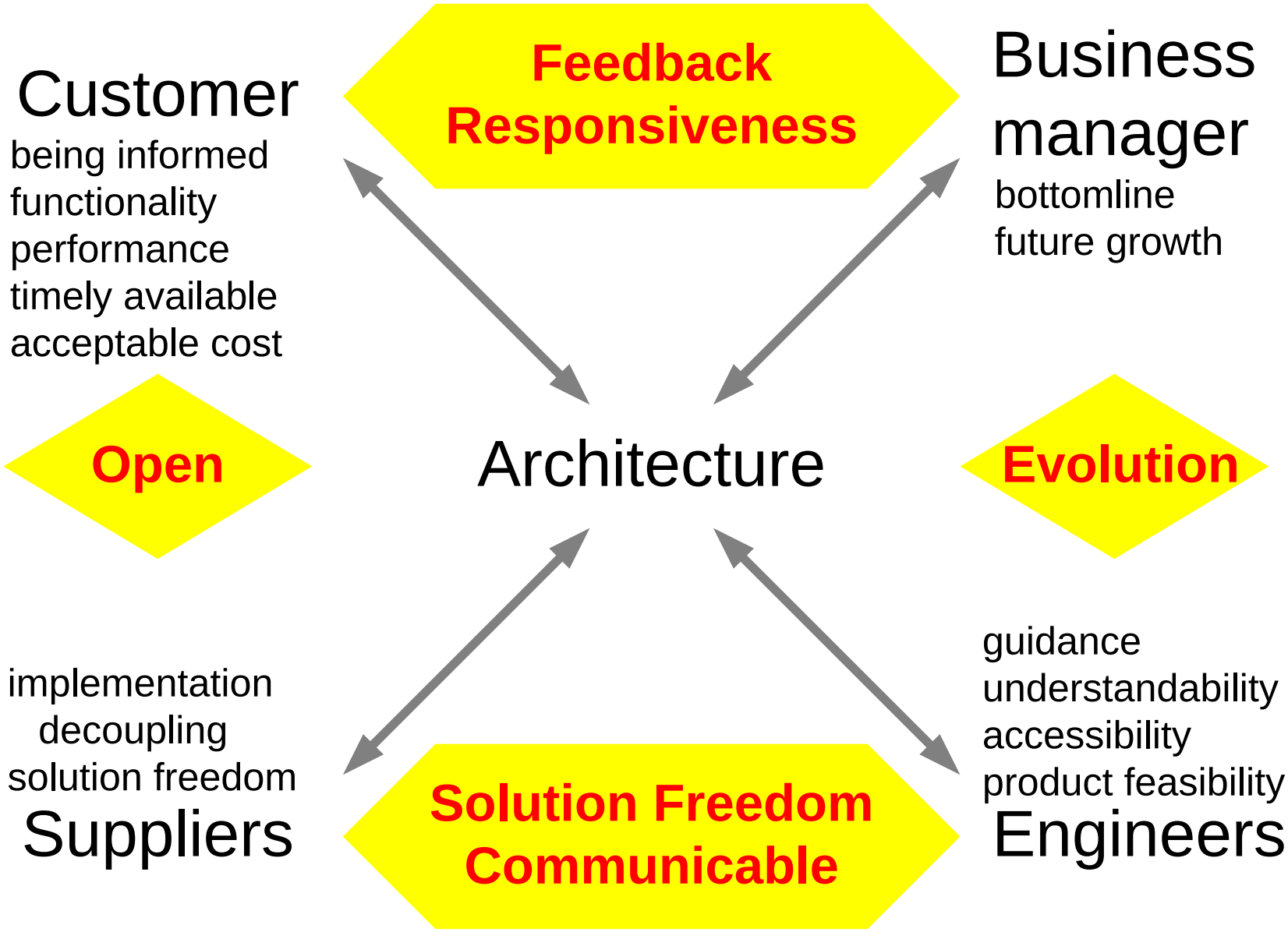


Integrity

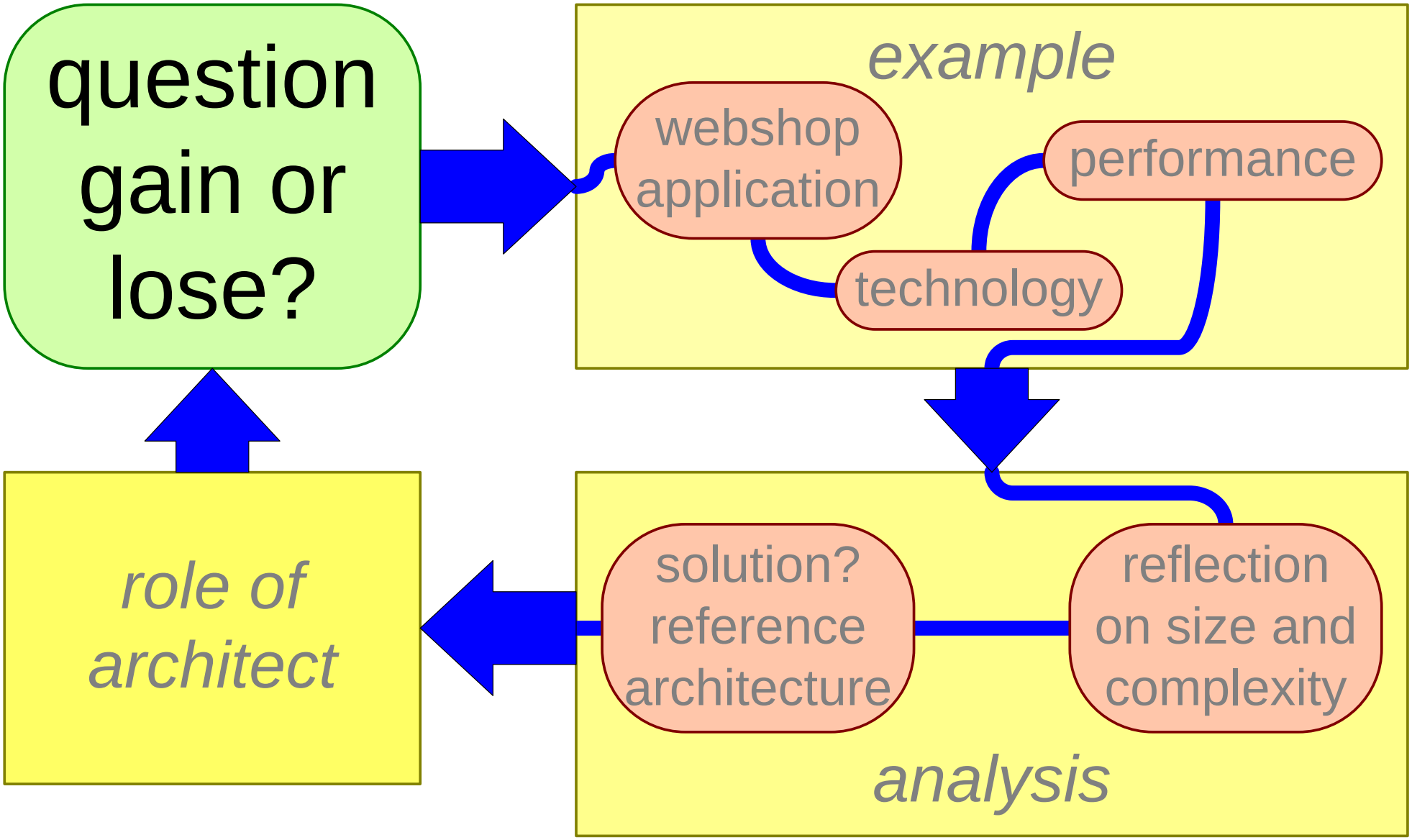


Fitting

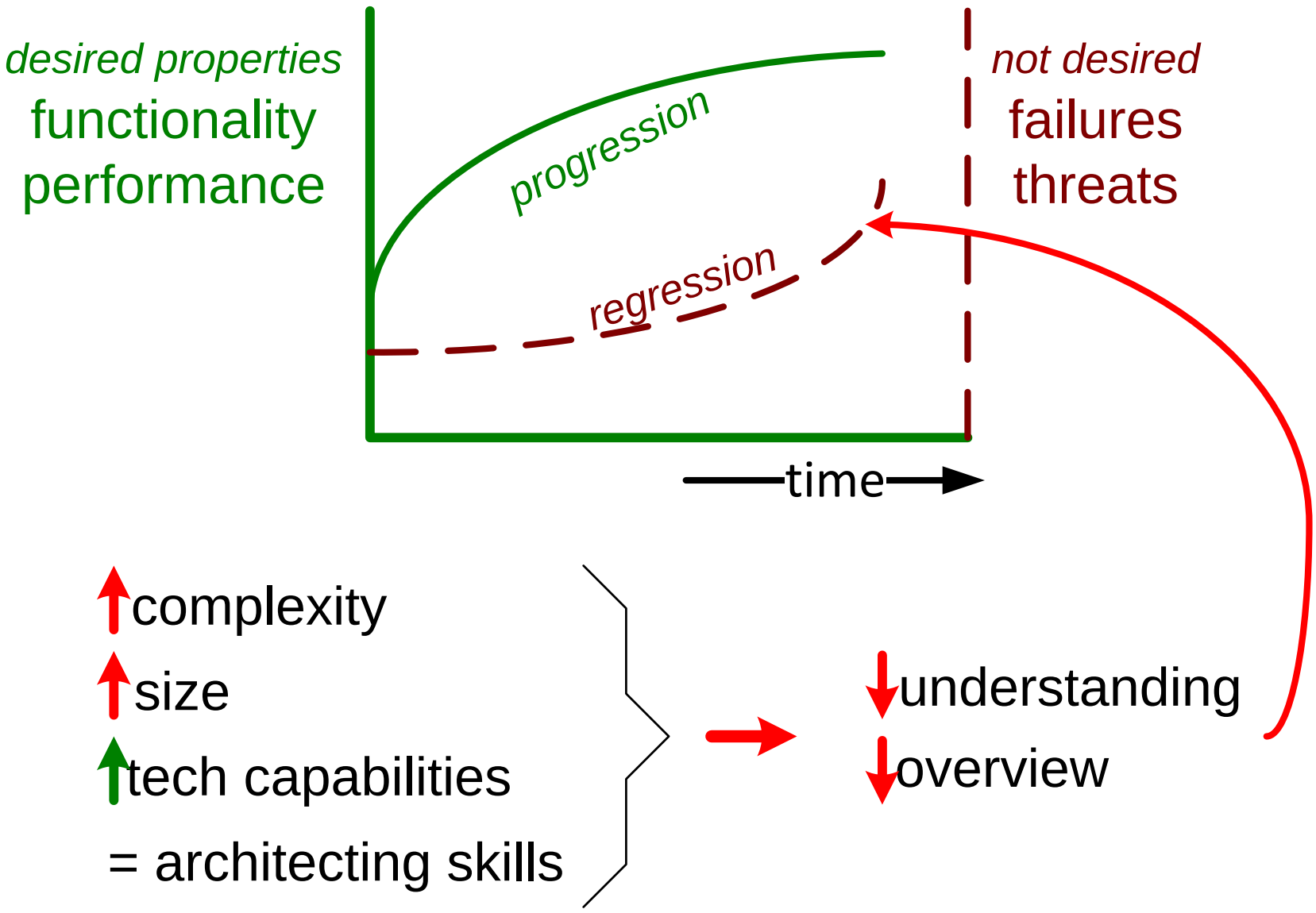
Stakeholders



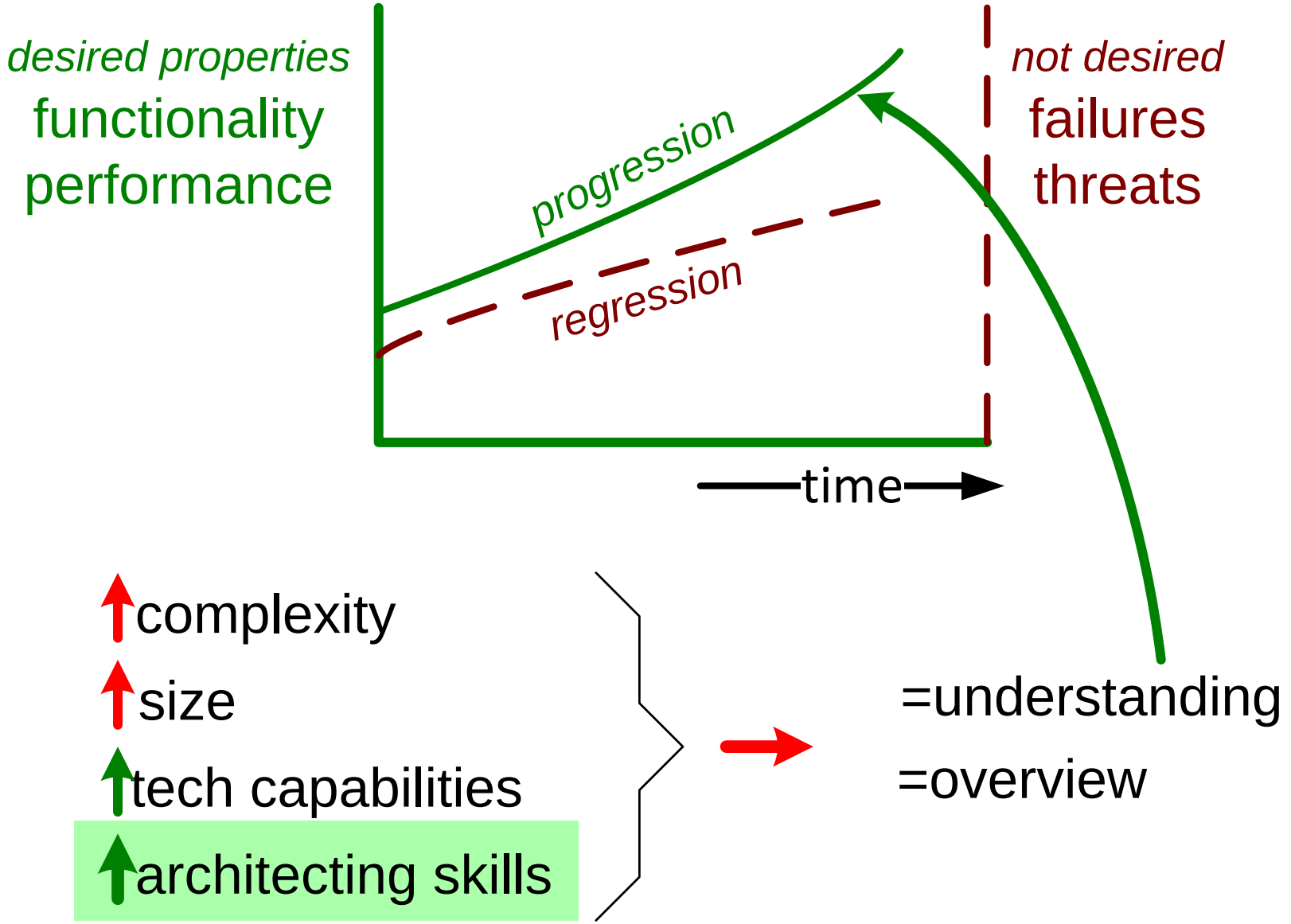
Gain or Lose?


question
gain or
lose?
example
webshop
application
performance
technology
solution?
reference
architecture
reflection
on size and
complexity
analysis
role of
architect

Loss Scenario

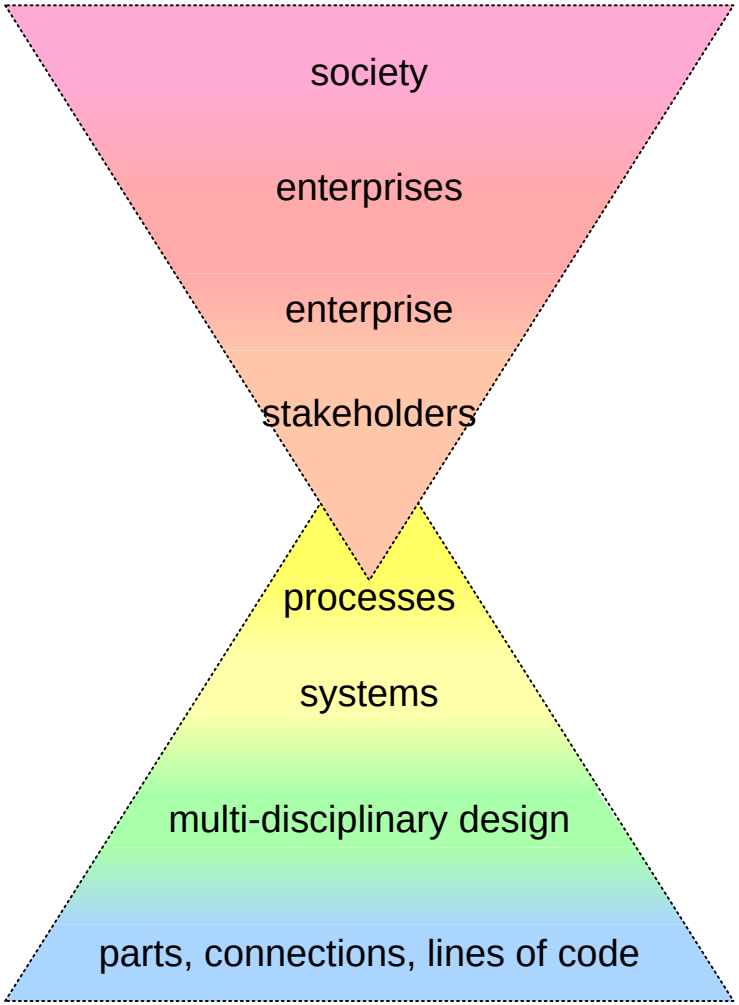


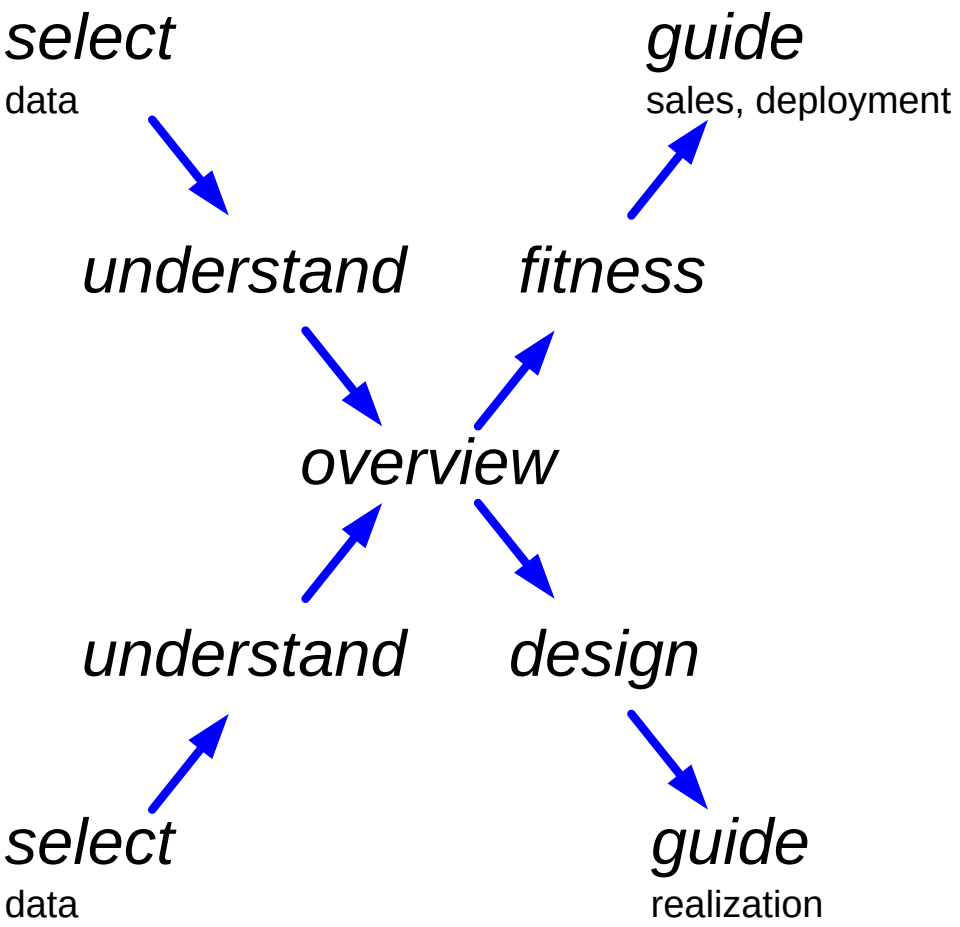
Gain Scenario



Conclusion

We need to improve architecting skills to gain.





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