High Level Modeling to Support Software Design

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Abstract

High level models are simple models with the primary goal to support understanding, analysis, communication and decision making. The models have different complementary representations and formats, e.g. visual diagrams, mathematical formulas, and quantitative information and graphs.
The models are made at different levels to guide software design choices: enterprise level, specification level, and design.

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version: 0

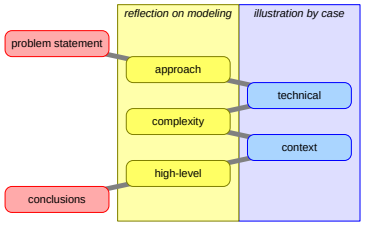
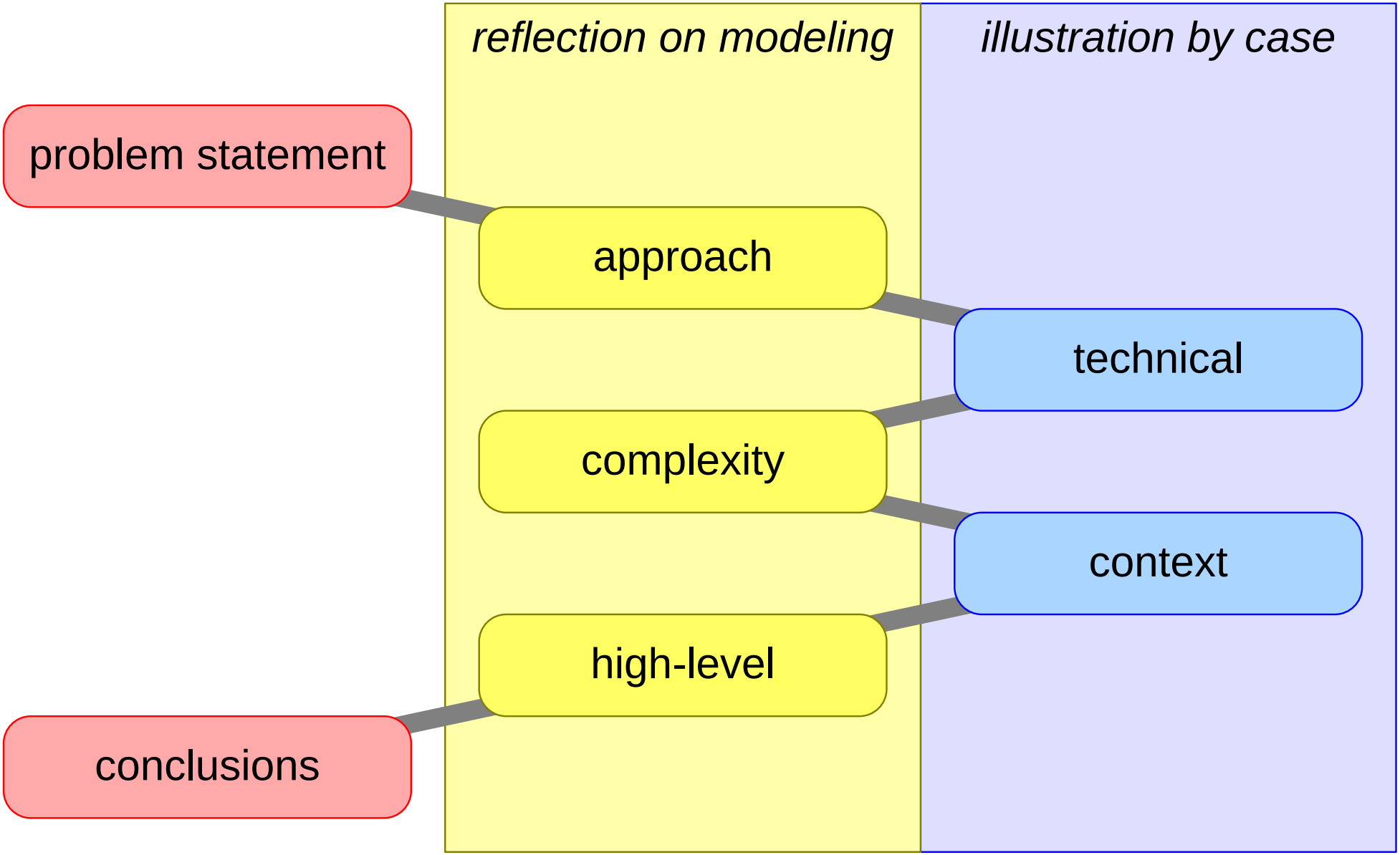
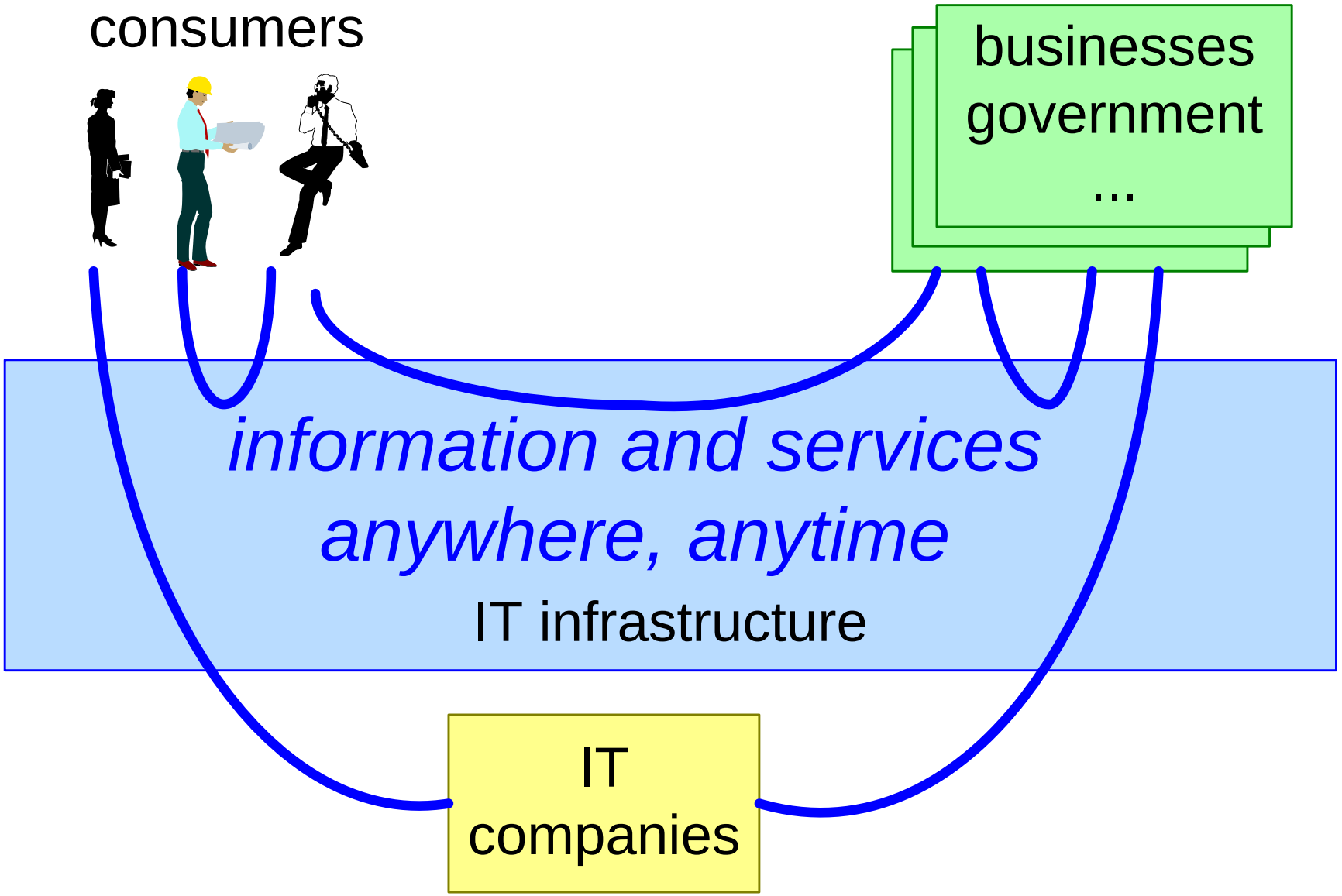


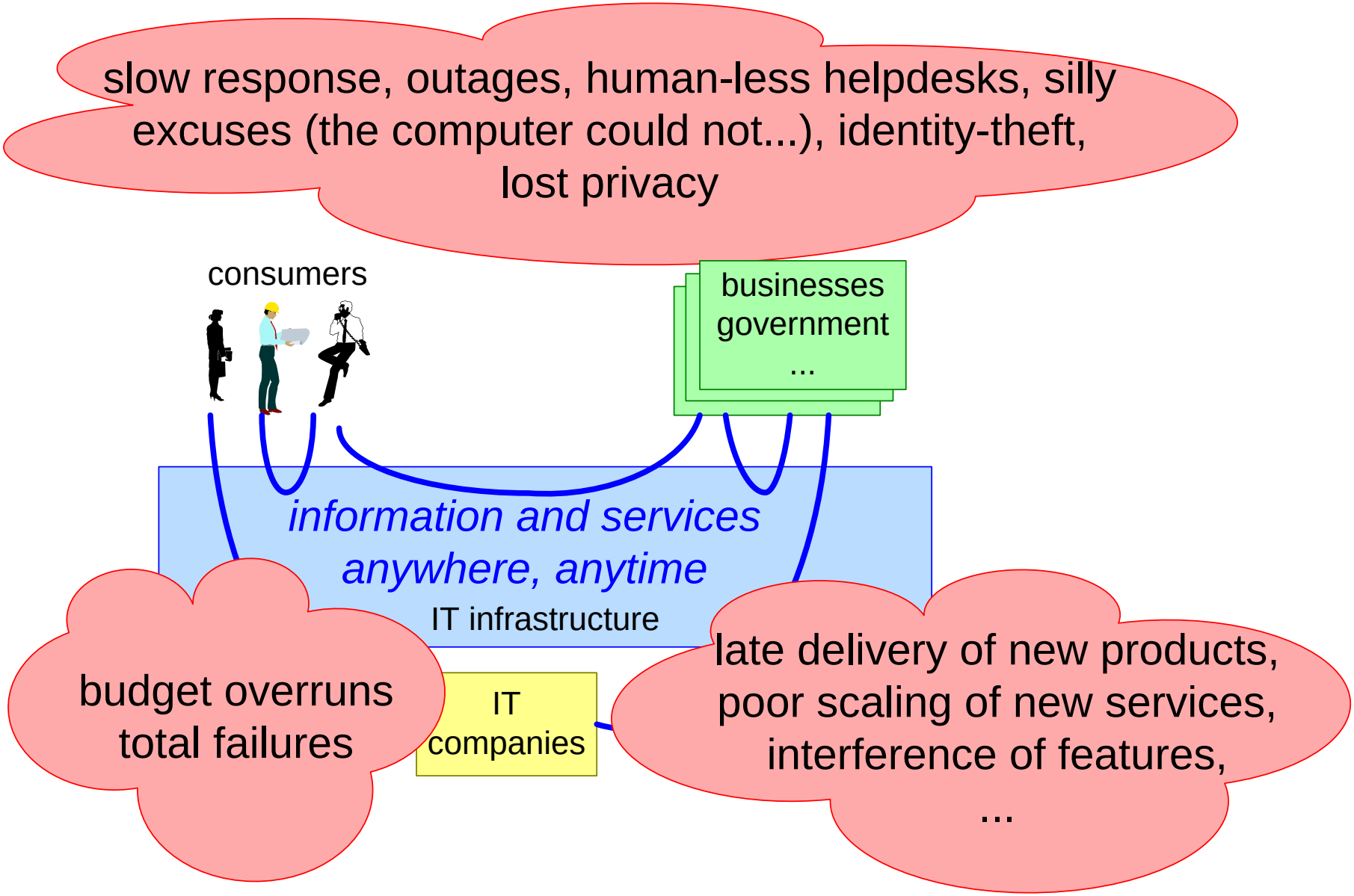
Figure Of Contents™



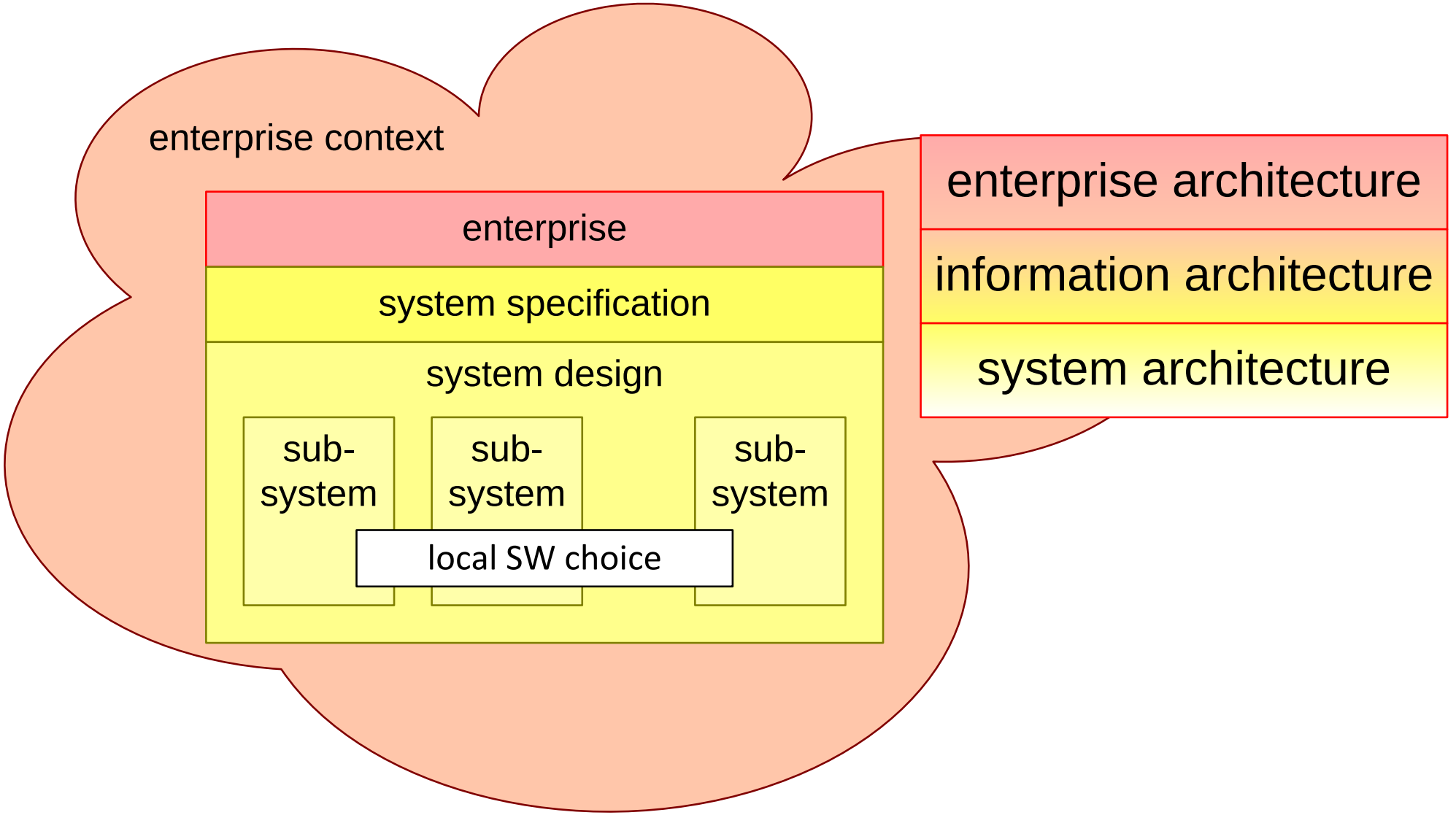
Ubiquitous Information and Services

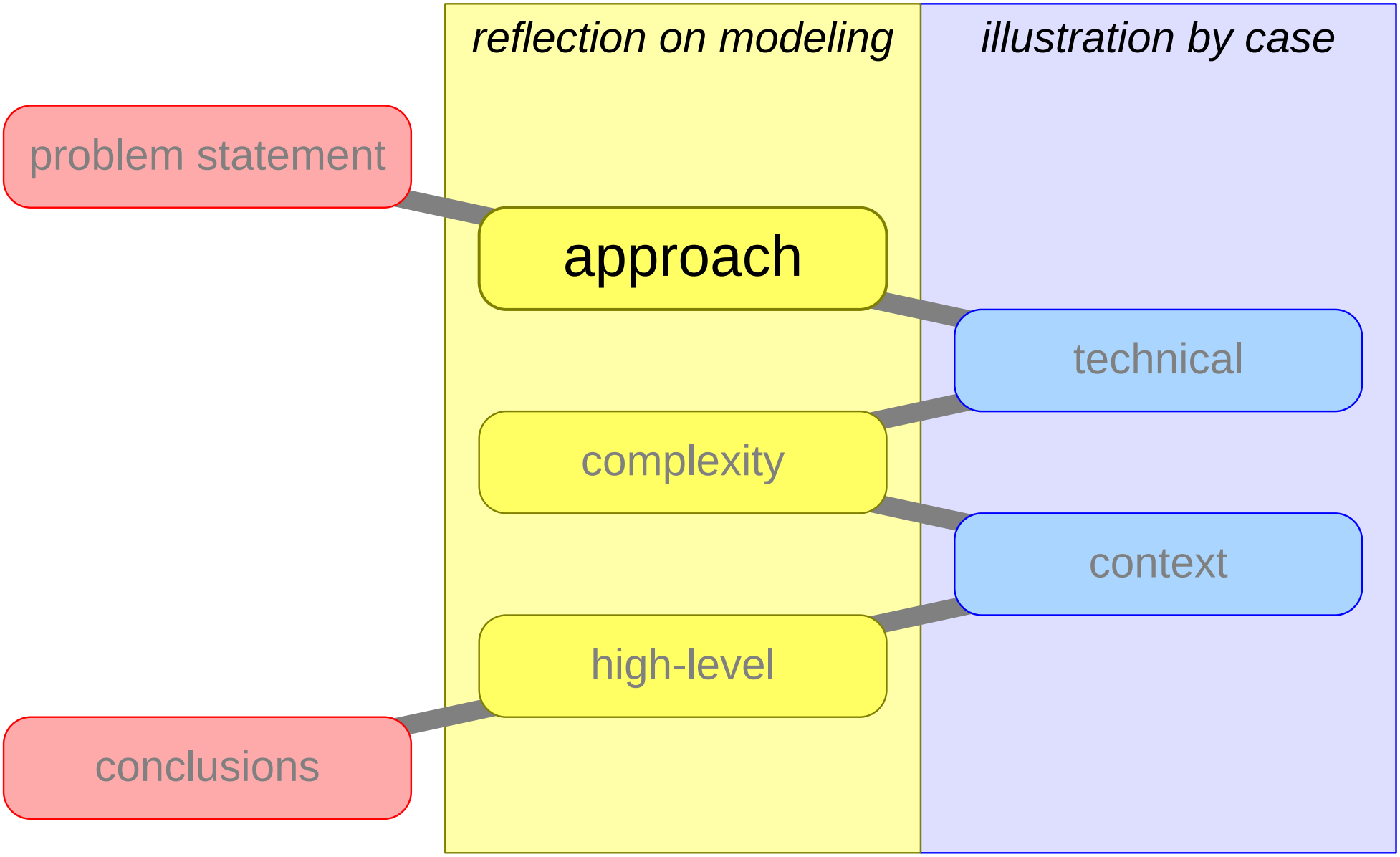


But, Horrendous Failure Rate



Typical Architecture Levels in IT

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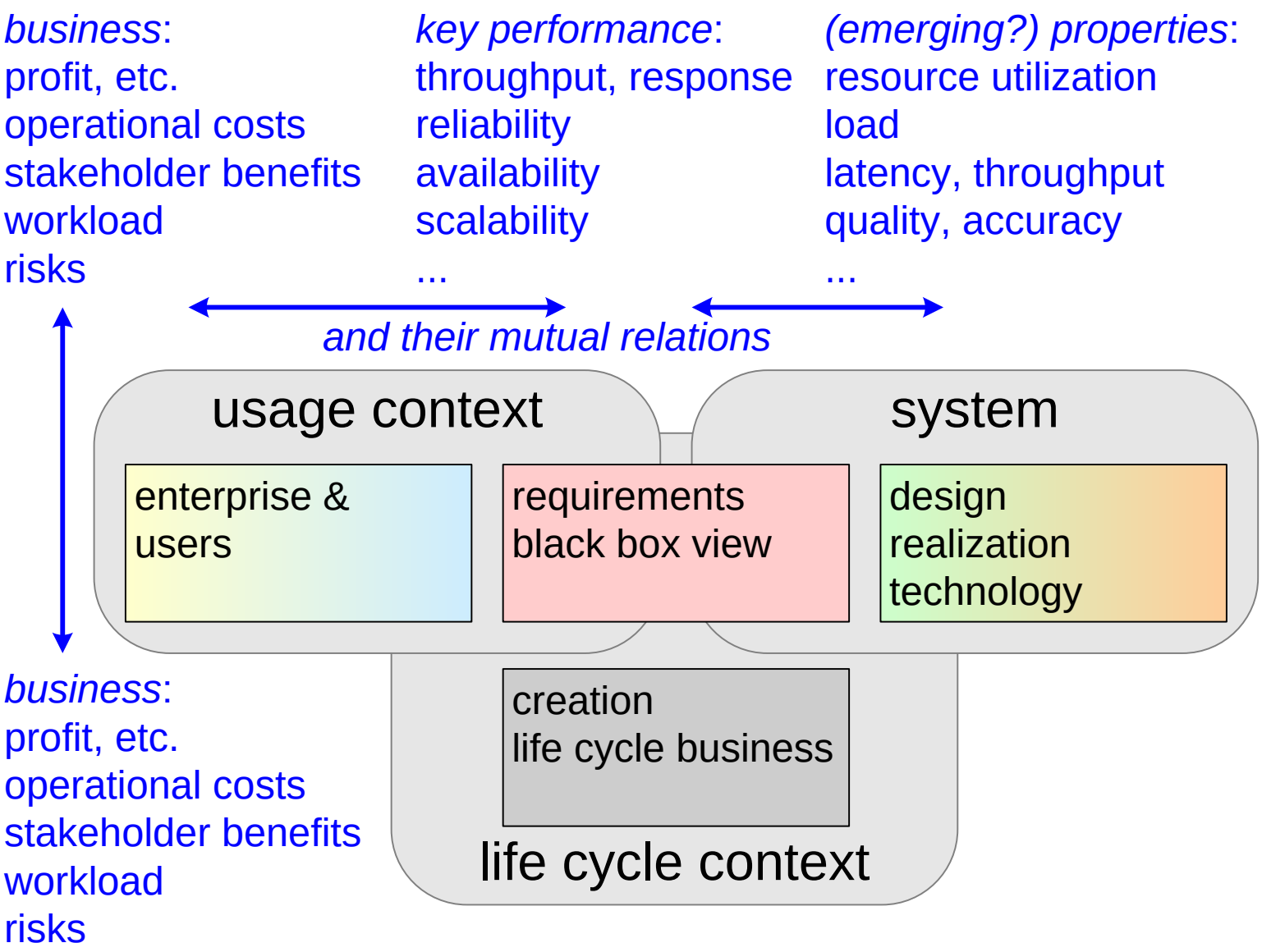
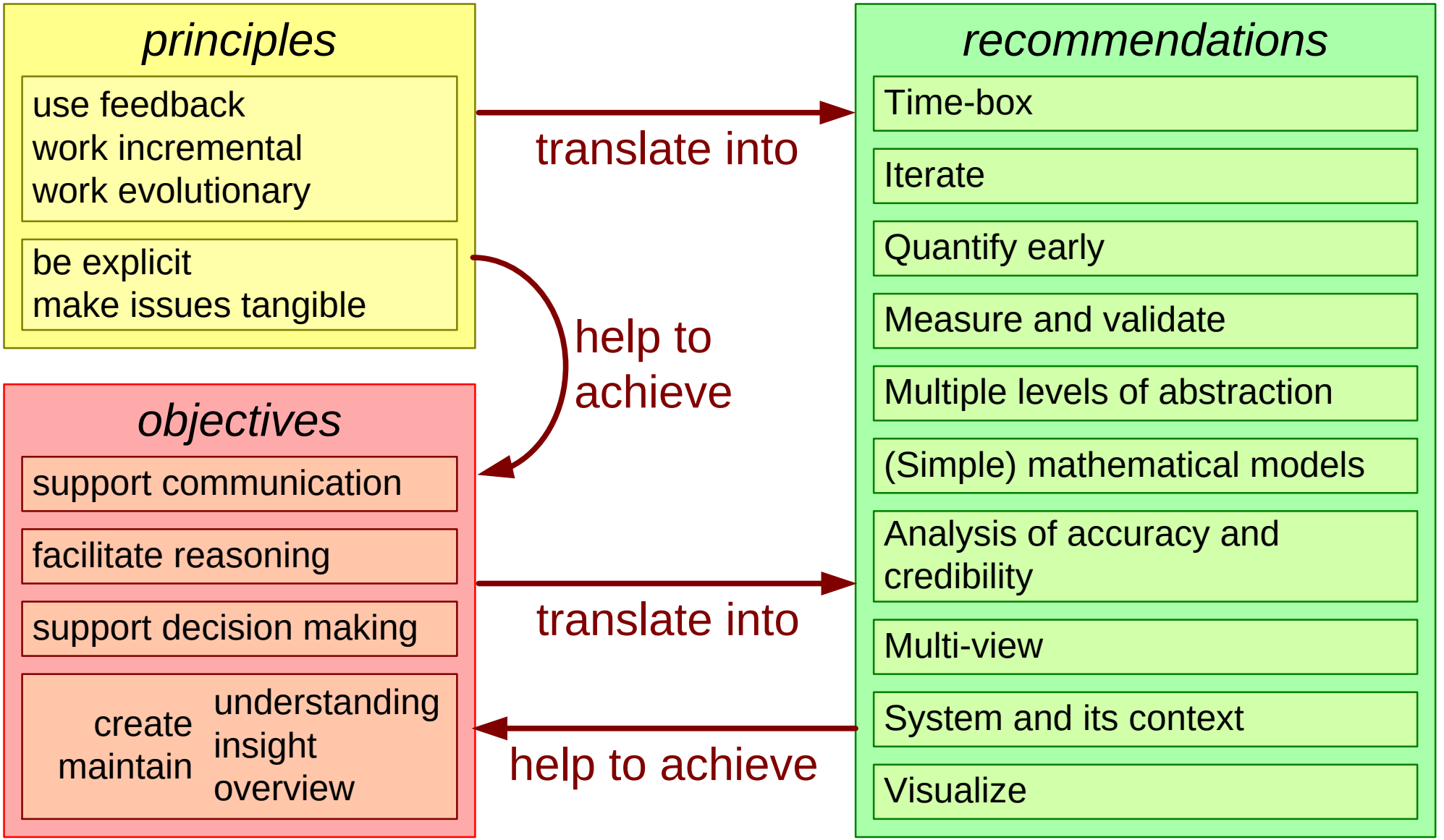
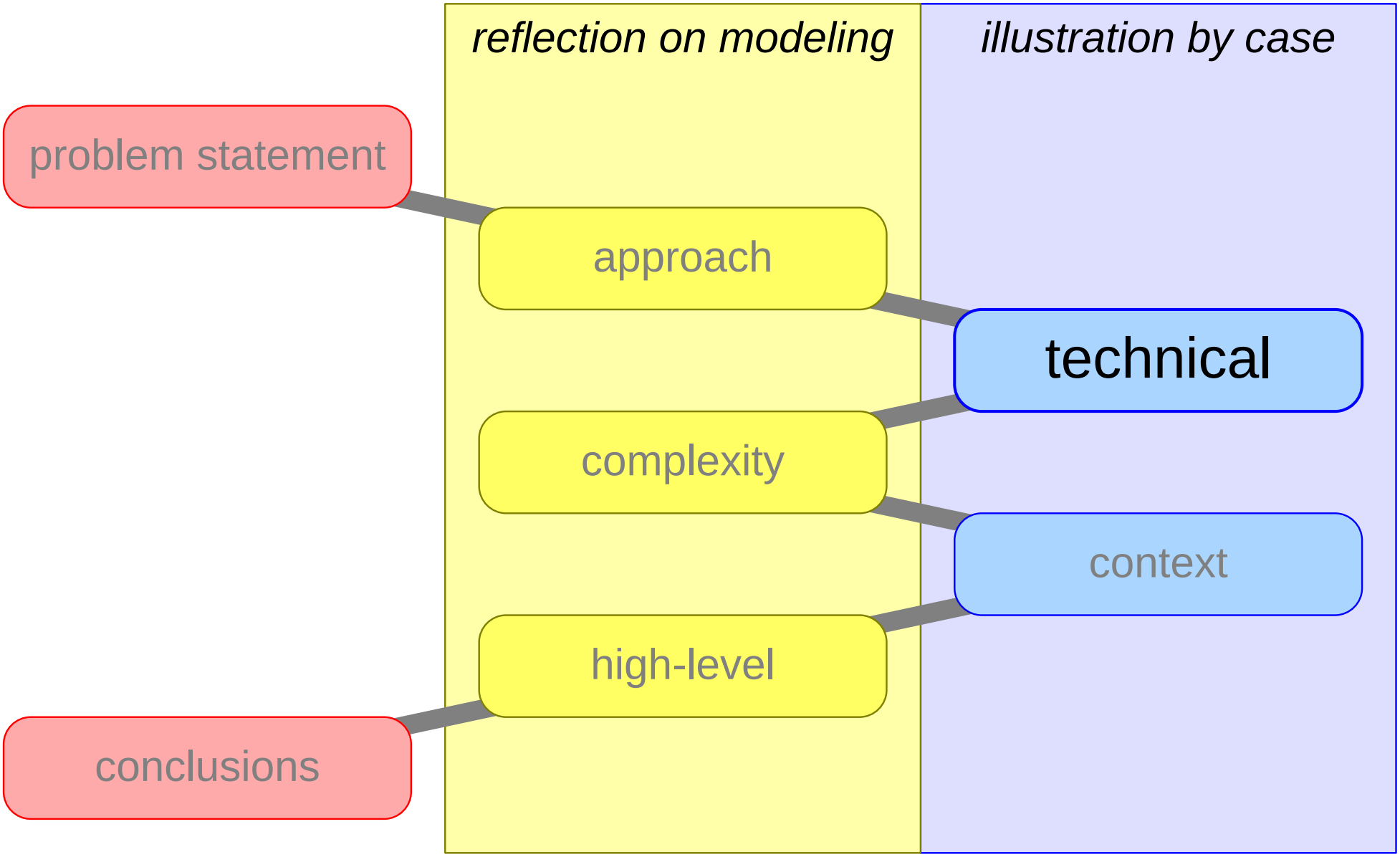
Simplified Framework for Modeling



Recommendations for Modeling

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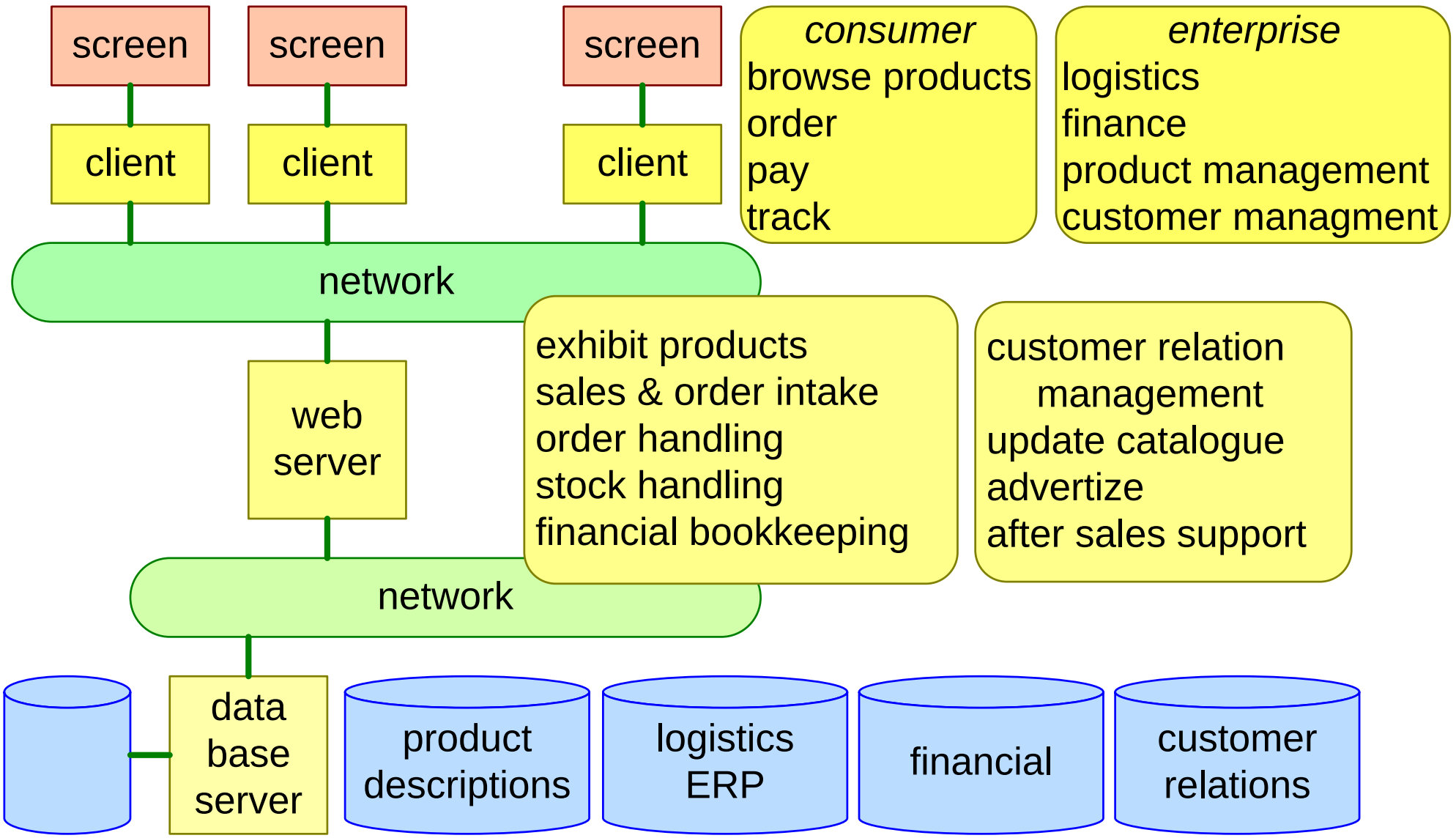
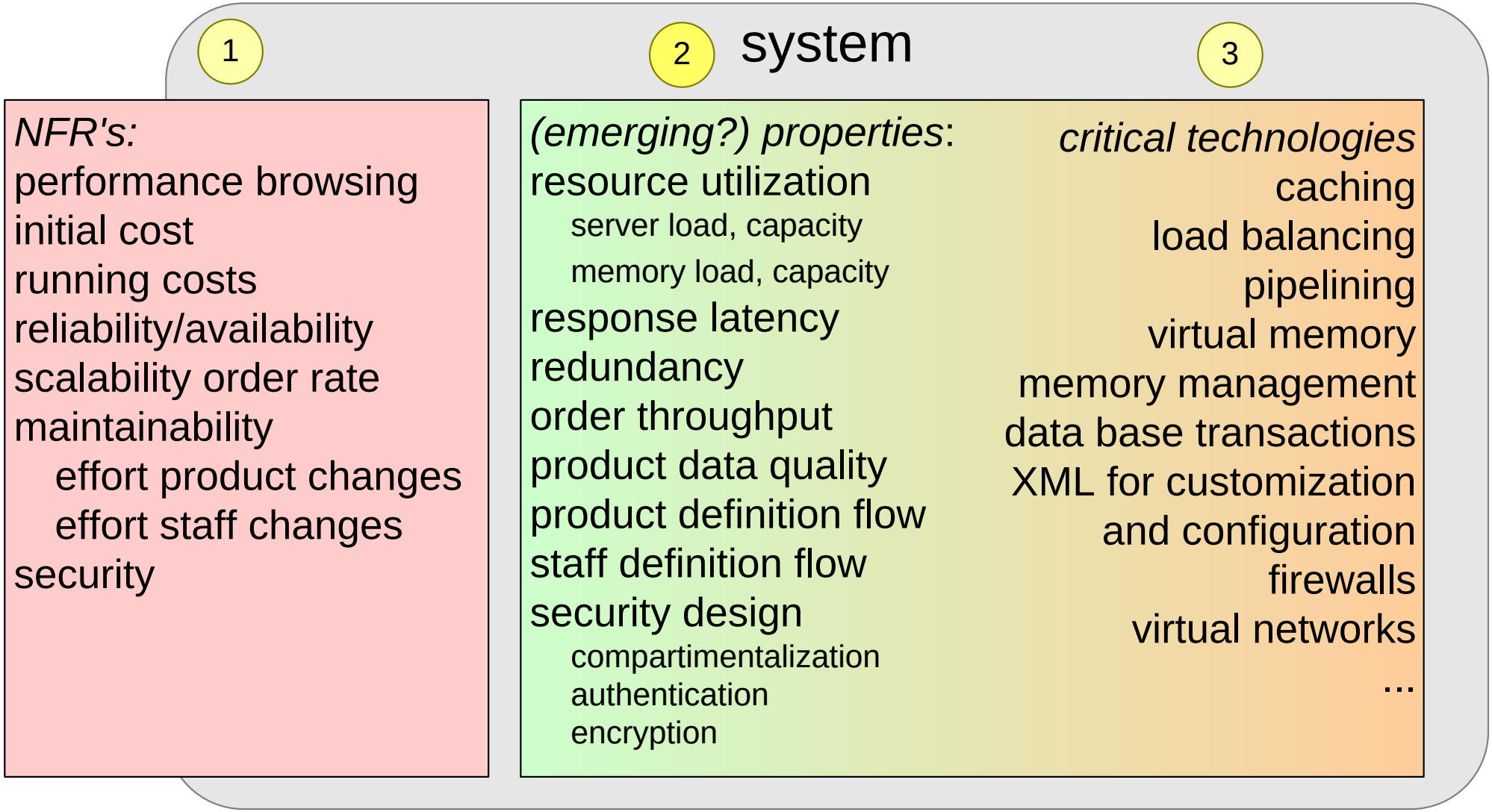
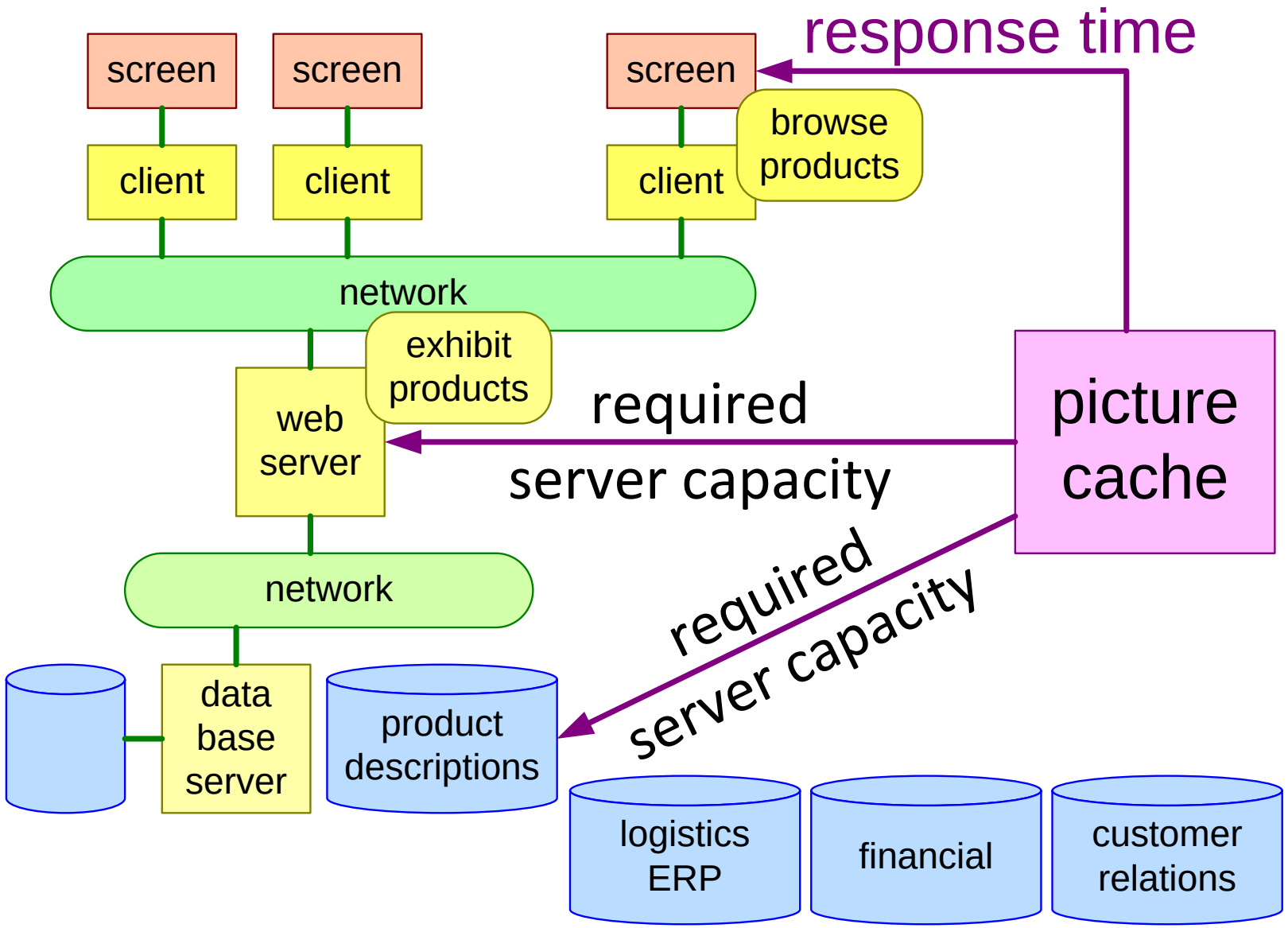
Example Web Shop

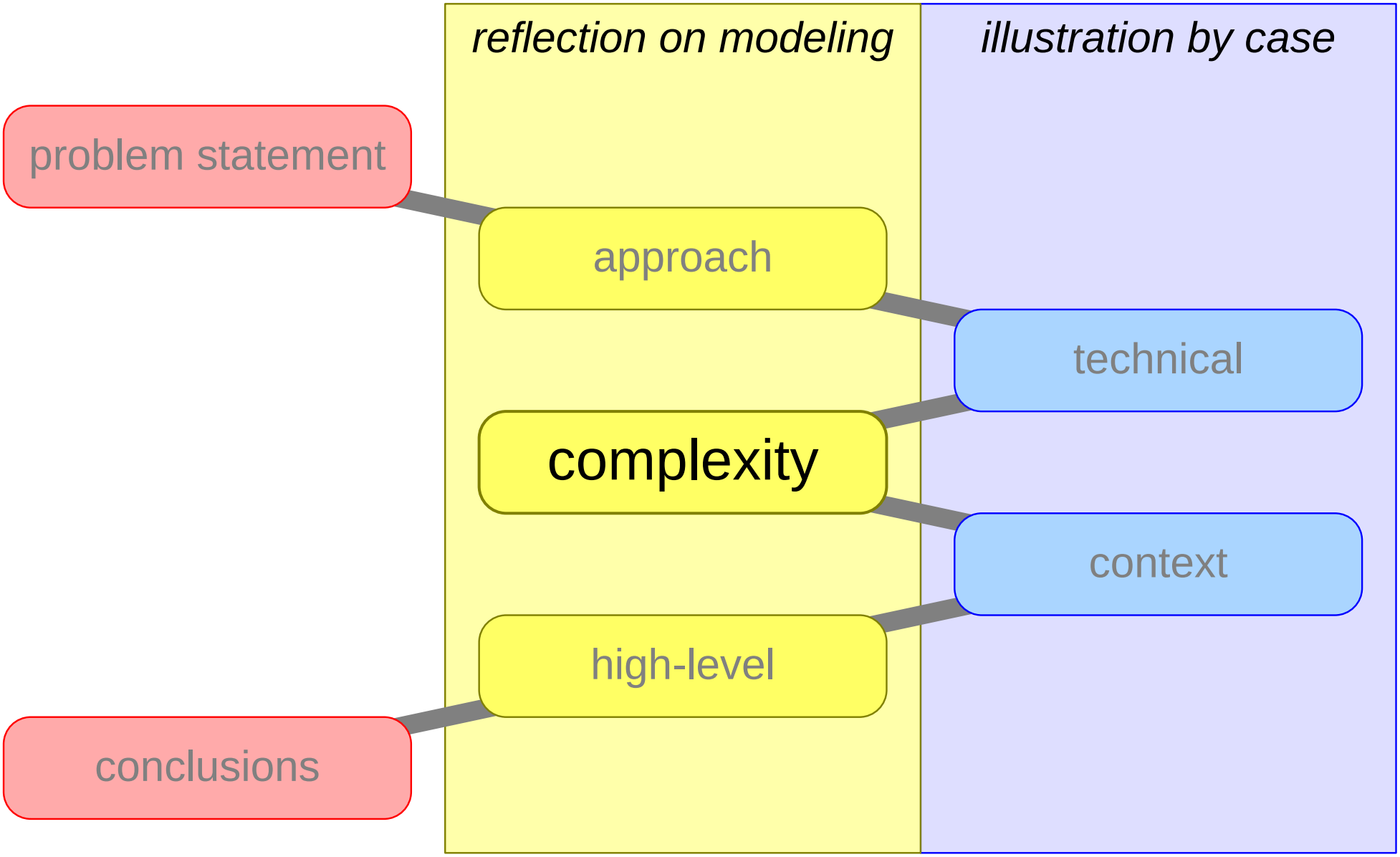


Web Shop: NFR's, Properties and Critical Technologies



Purpose of Picture Cache Model in Web Shop Context

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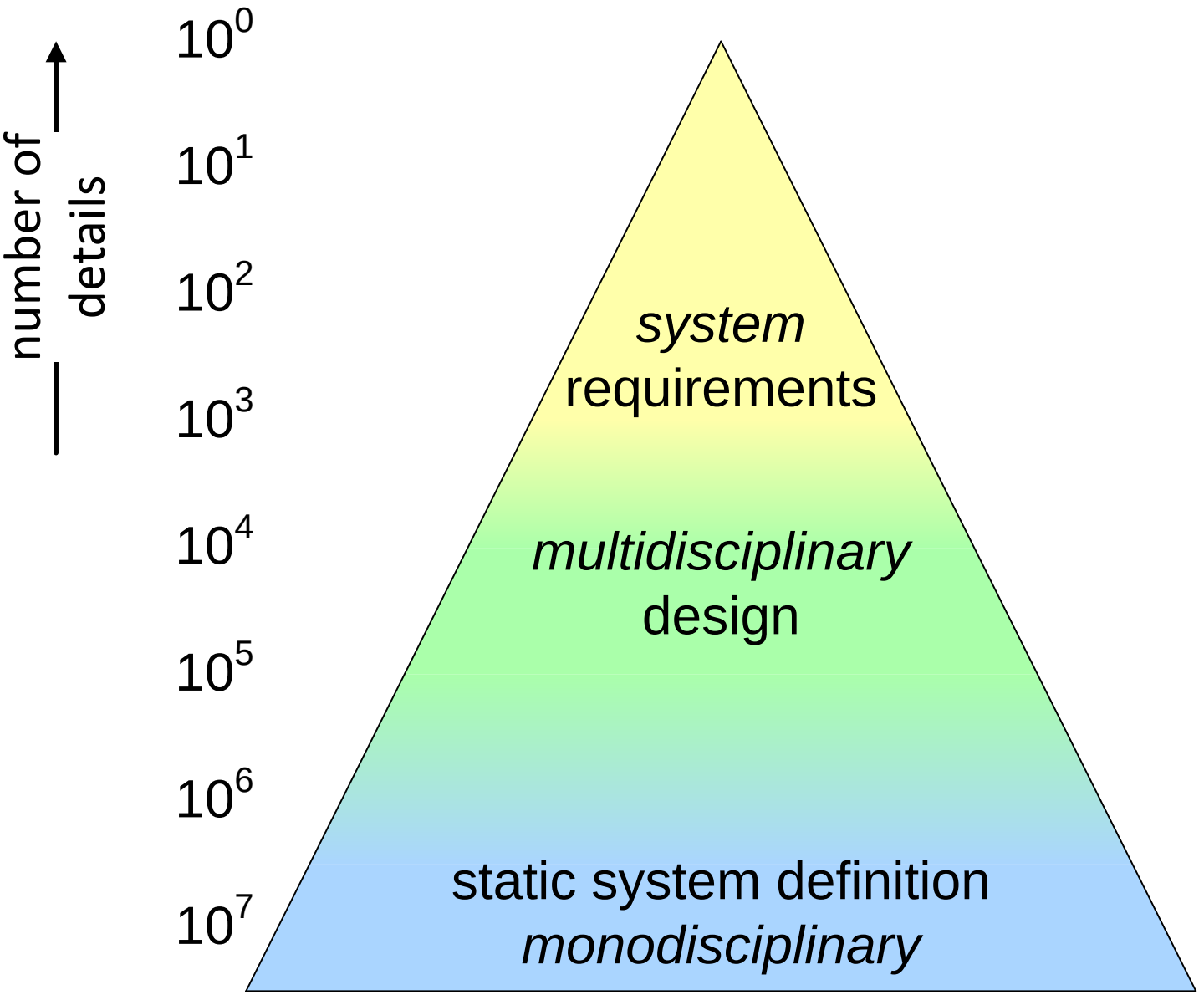
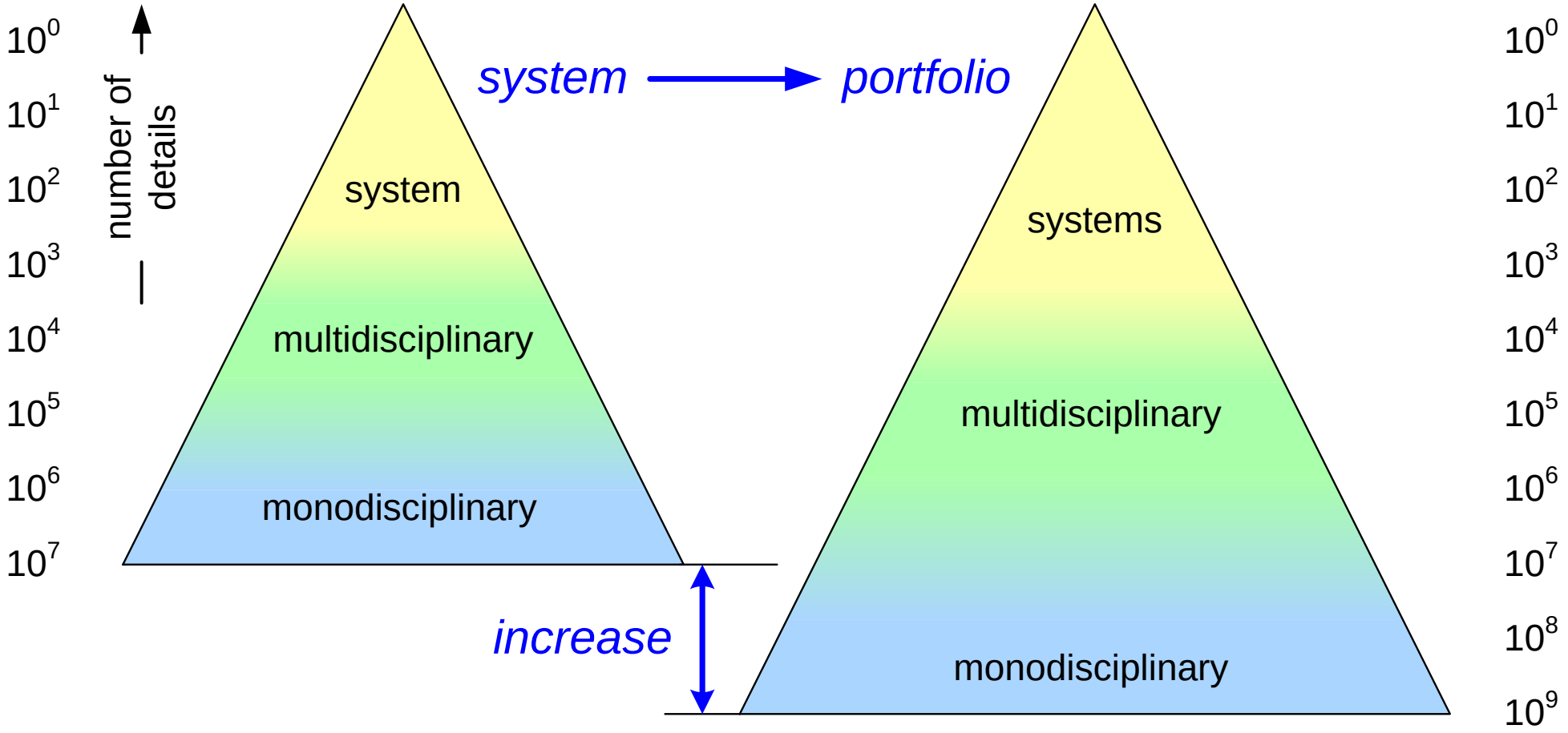
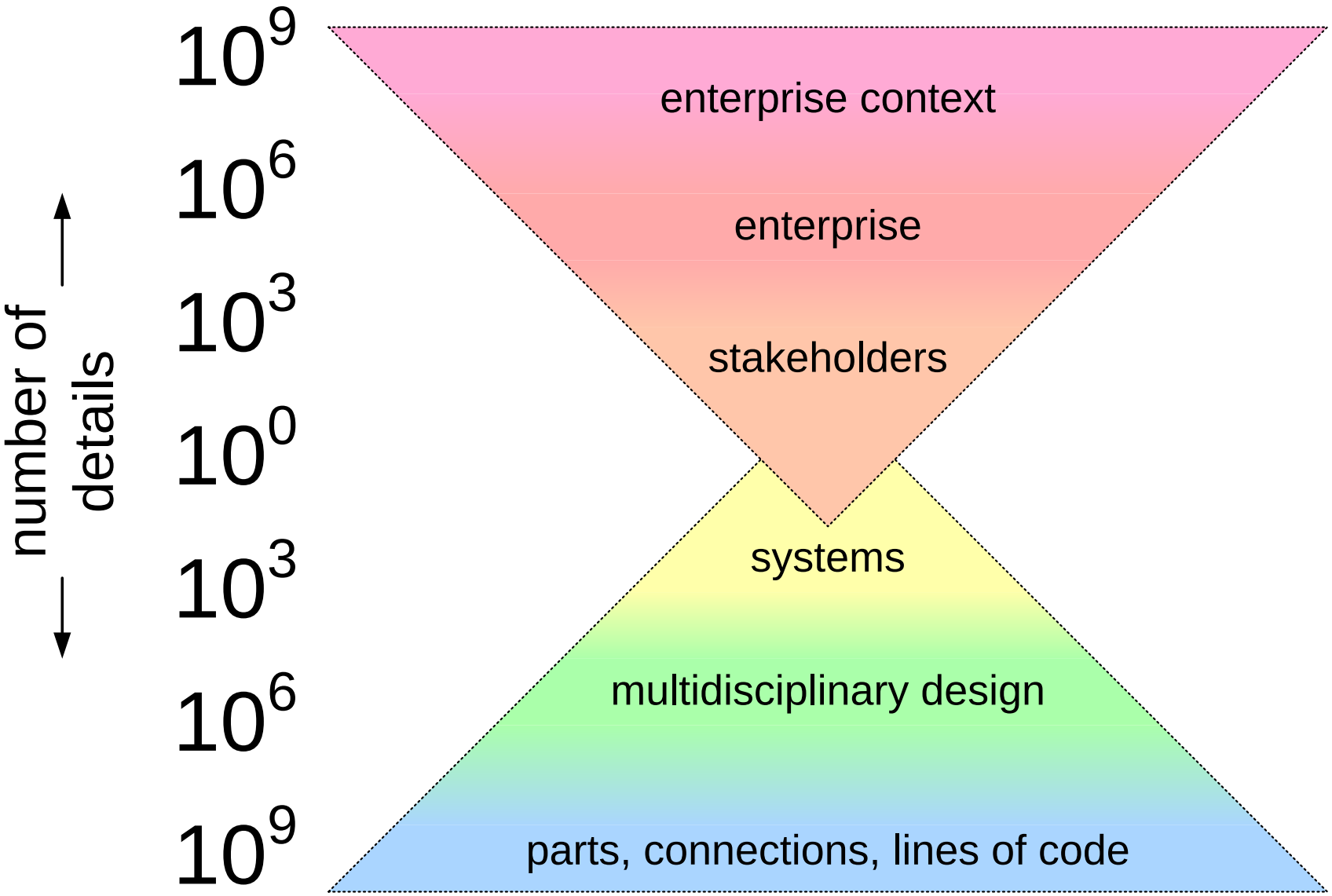
Level of Abstraction Single System



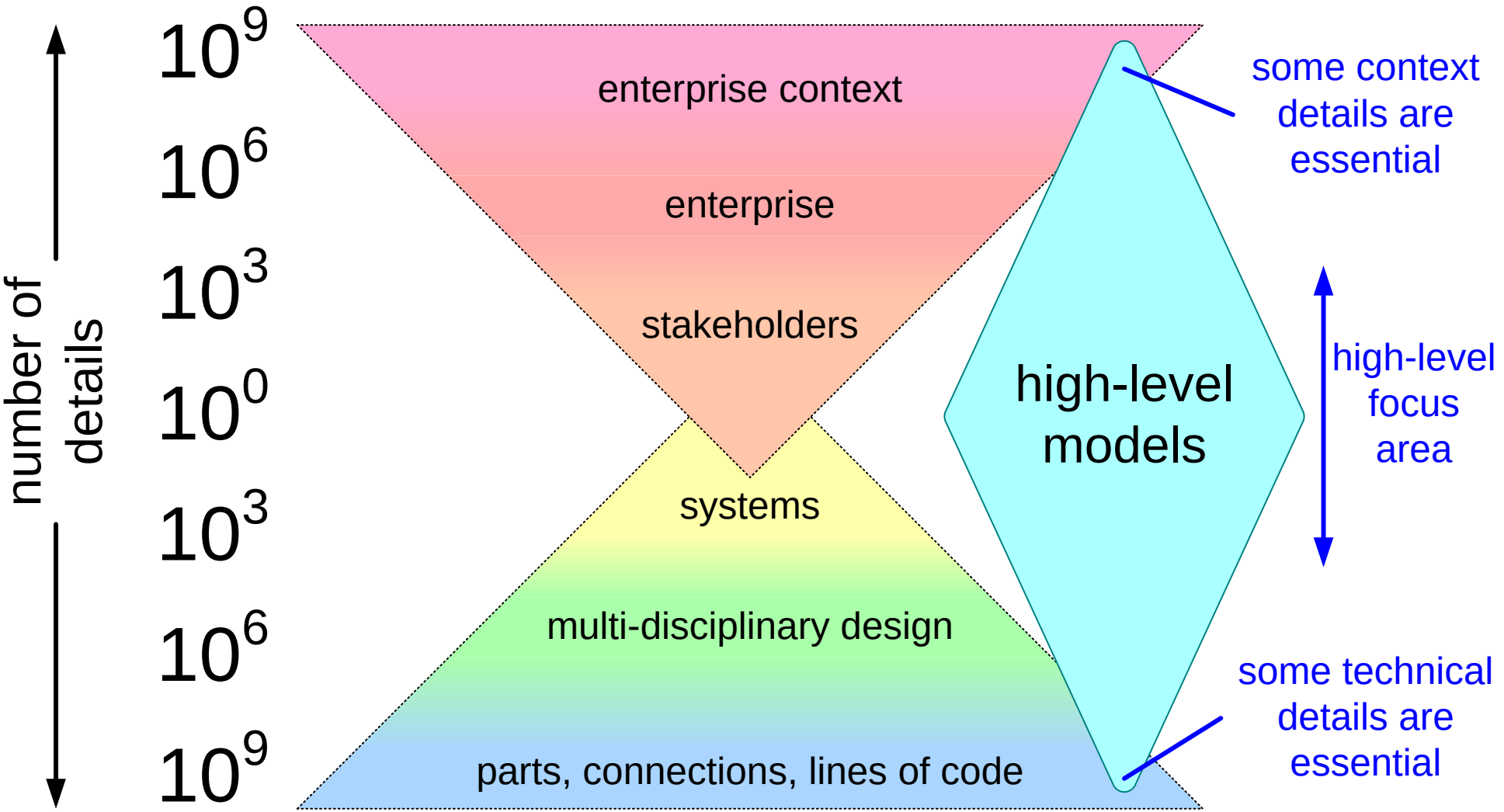
From system to Product Family or Portfolio

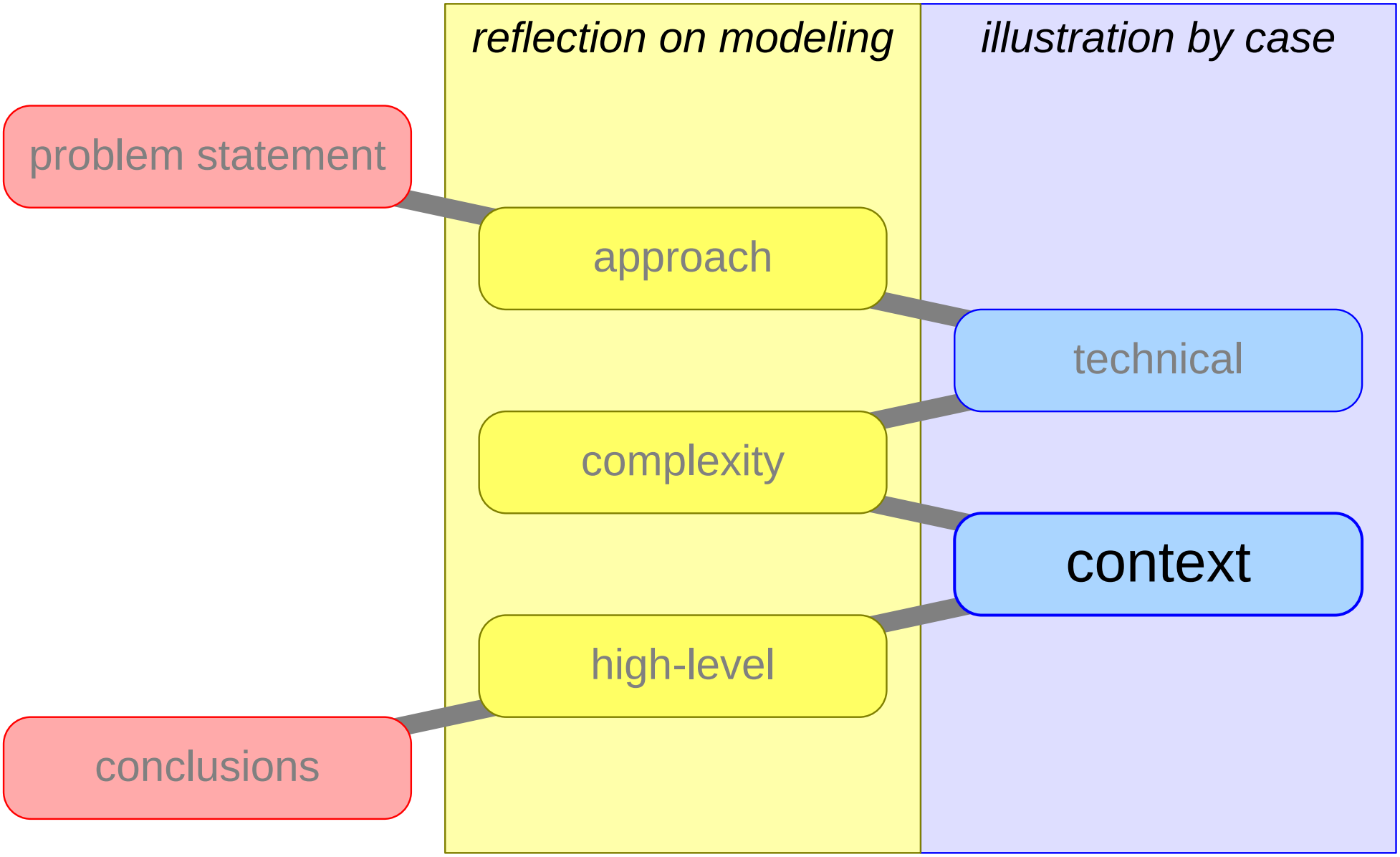


Product Family in Context



RA: Capturing the Essence

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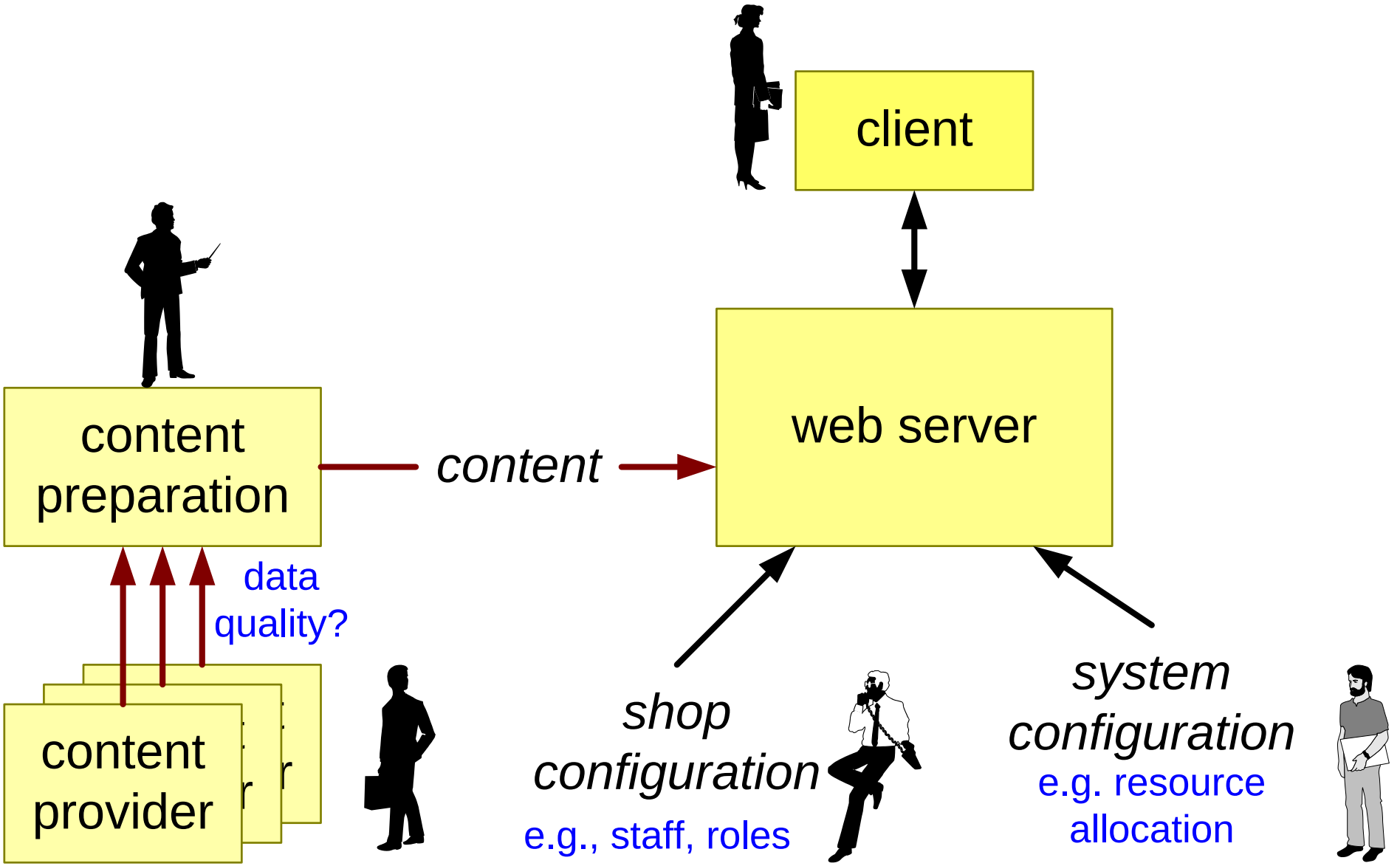
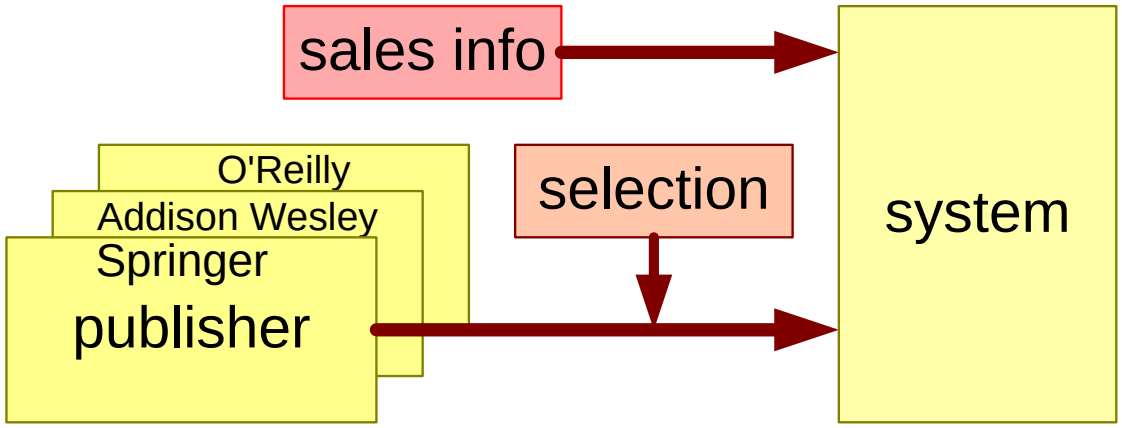
Data Sources of Web Server



Example Product Portfolio Change Books



product portfolio characteristics

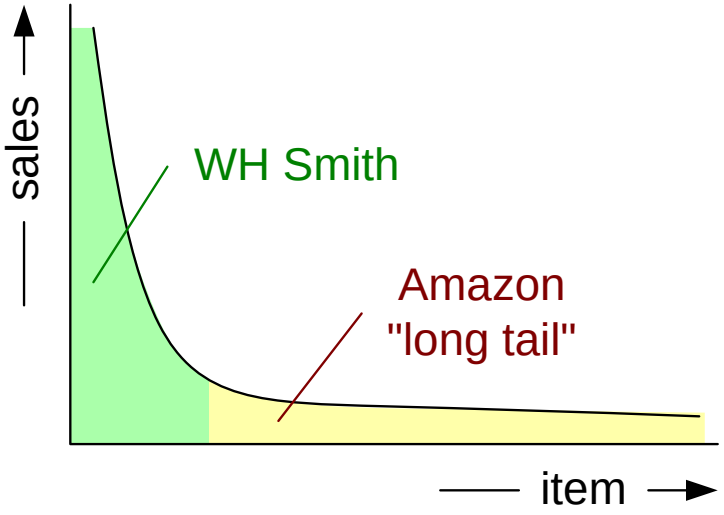
selection depends on business

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

Example Customer Change

internet: broadband penetration

	Q1 '04	Q2 '04	growth in Q2 '04
Asia Pacific total	48M	54M	12.8%
China	15M	19M	26.1%
India	87k	189k	116.8%

http://www.apira.org/download/world_broadband_statistics_q2_2004.pdf

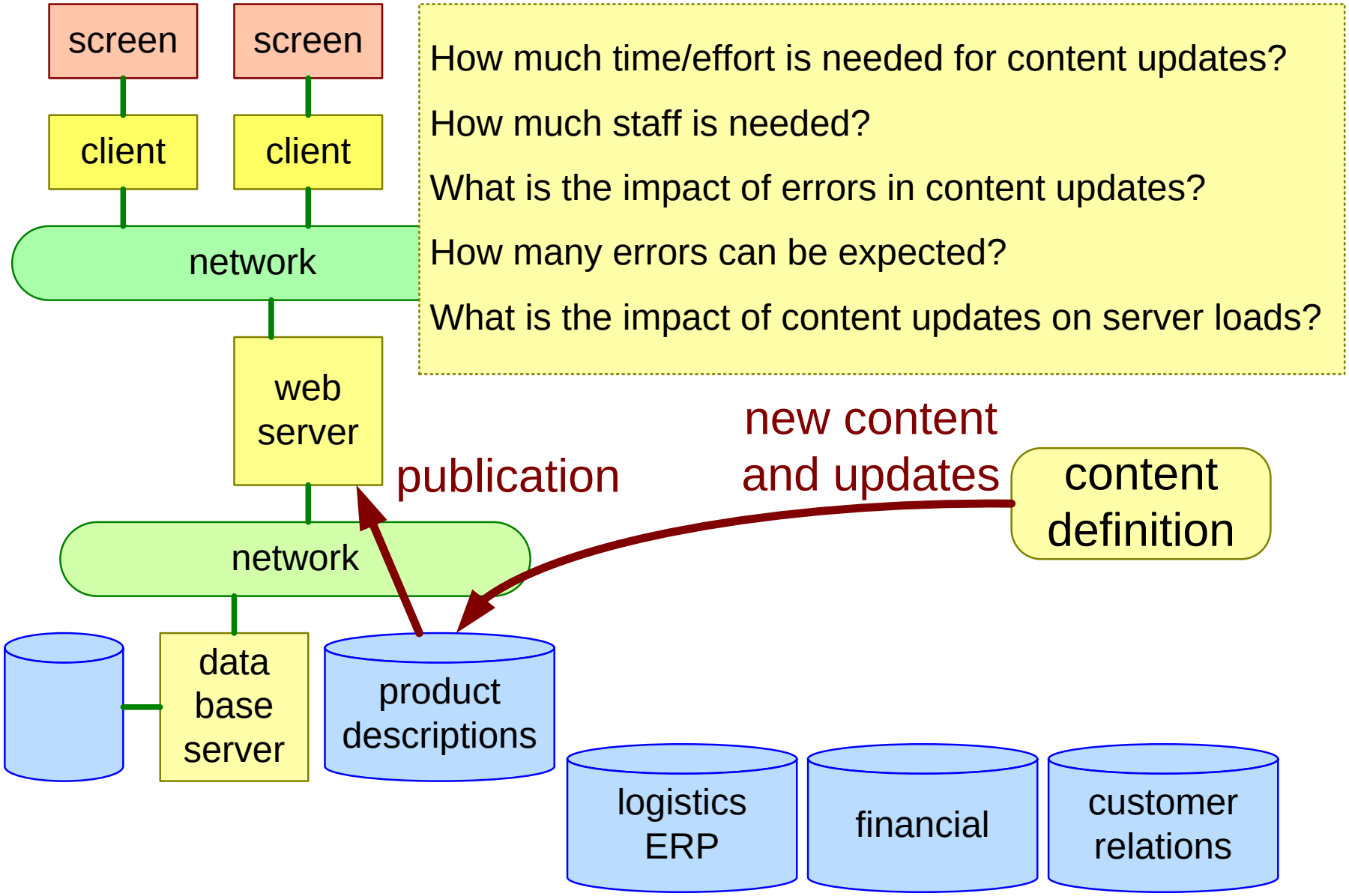
What is the expected growth of # customers?

What is the impact on system and infrastructure?

What is the impact on CRM (Customer Relation Management)?

What is the impact on customer, sales support staff?

Web Shop Content Update



Web Shop Content Change Effort

prepare change 1	prepare change 2		prepare change n

review input
select info
layout&cosmetics
check-in

verify change 1		verify change n

inspect source
inspect result

commit changes

$$effort_{changes} = n_{changes}*(t_{prepare} + t_{verify})+t_{commit}$$

$$\#fte = effort_{changes} / hours\ per\ day$$

$n_{changes}$ per day	10	100	1000
$effort_{changes}$	1 uur	10 uur	100 uur
#fte	0.1	1	12

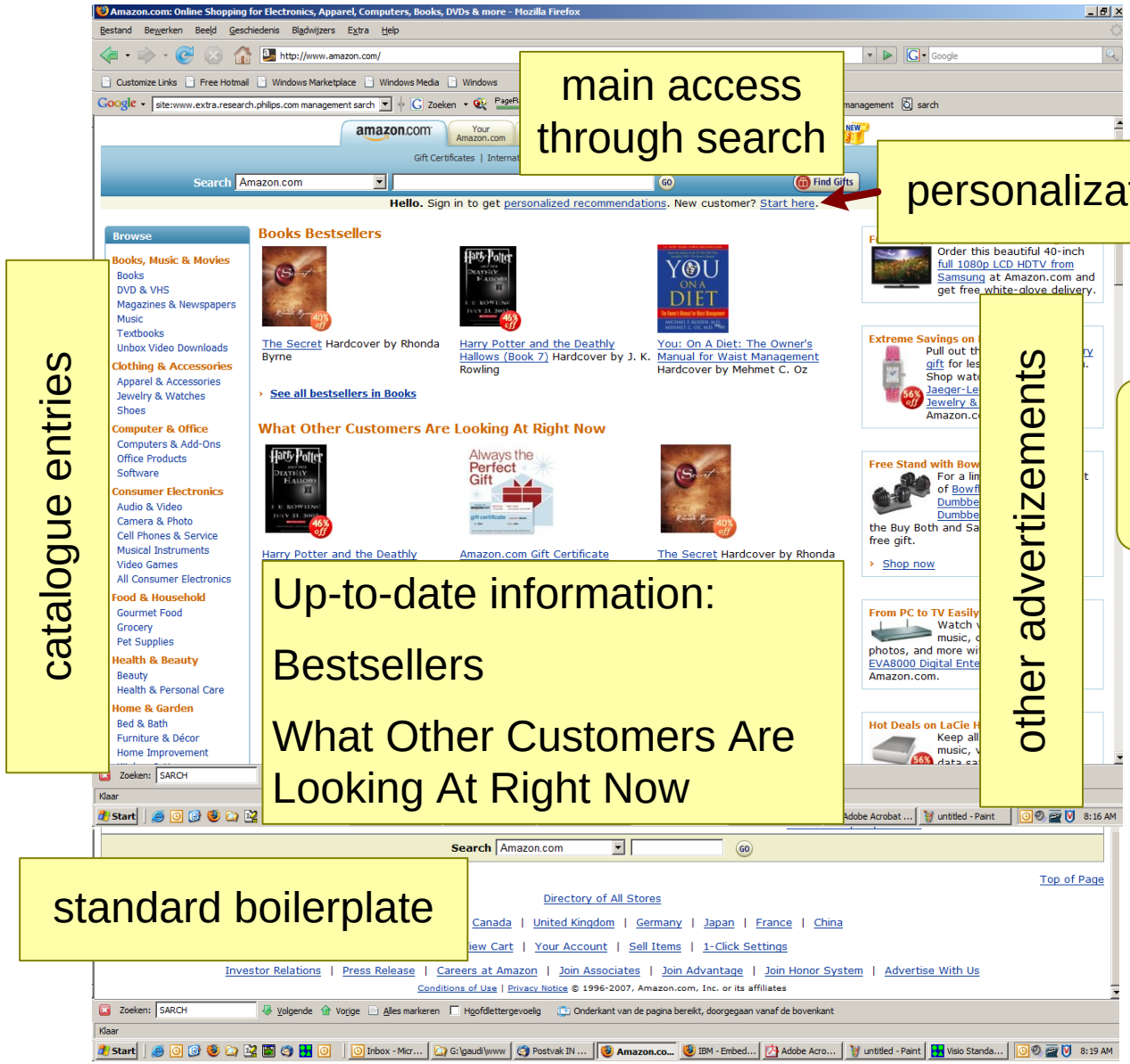
with $t_{prepare}$ = 4 min

t_{verify} = 2 min

t_{commit} = 1 min

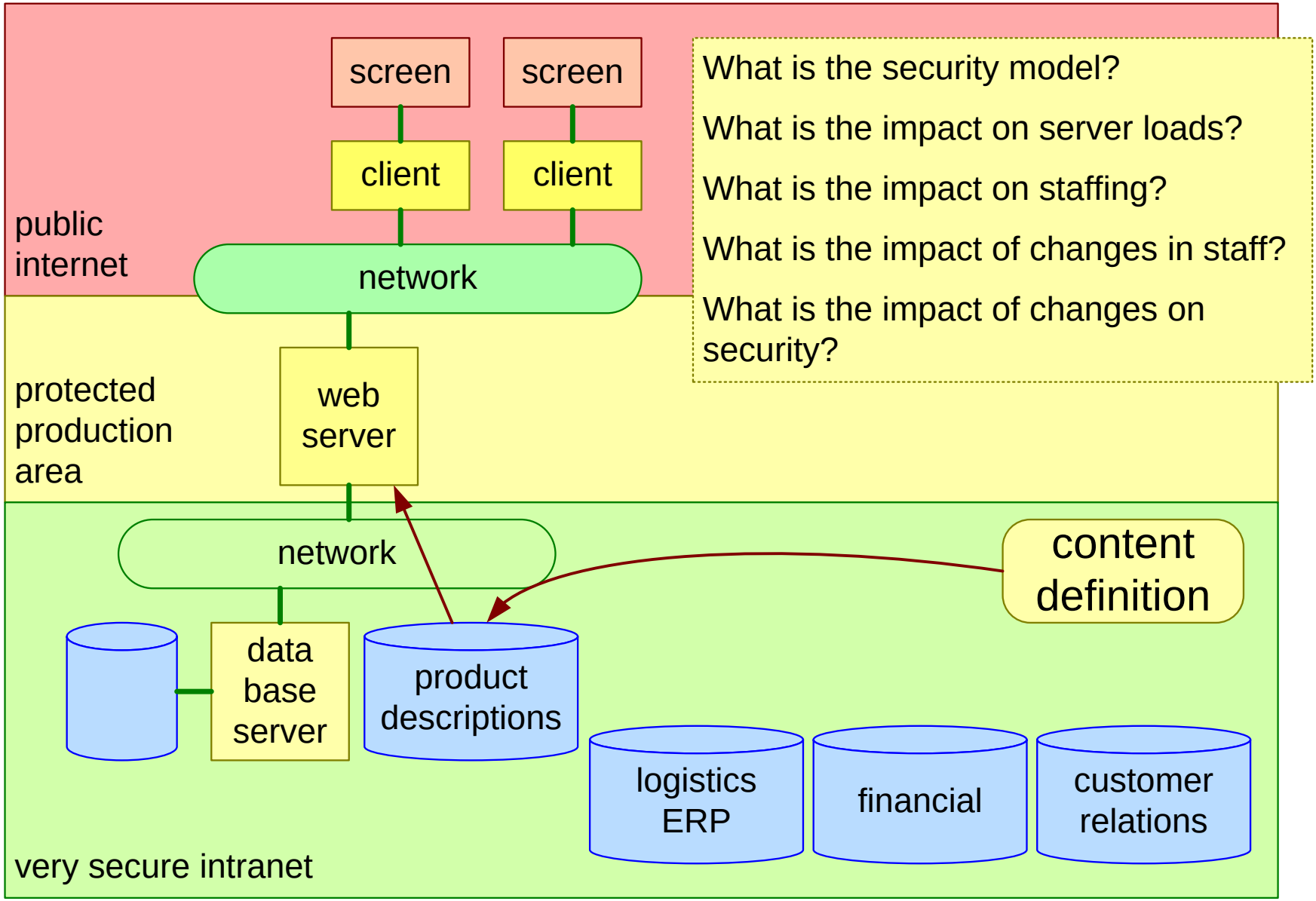
hours per day = 8 hours

Example of Client Level Changes



snapshot of www.amazon.com

Web Shop Security and Changes

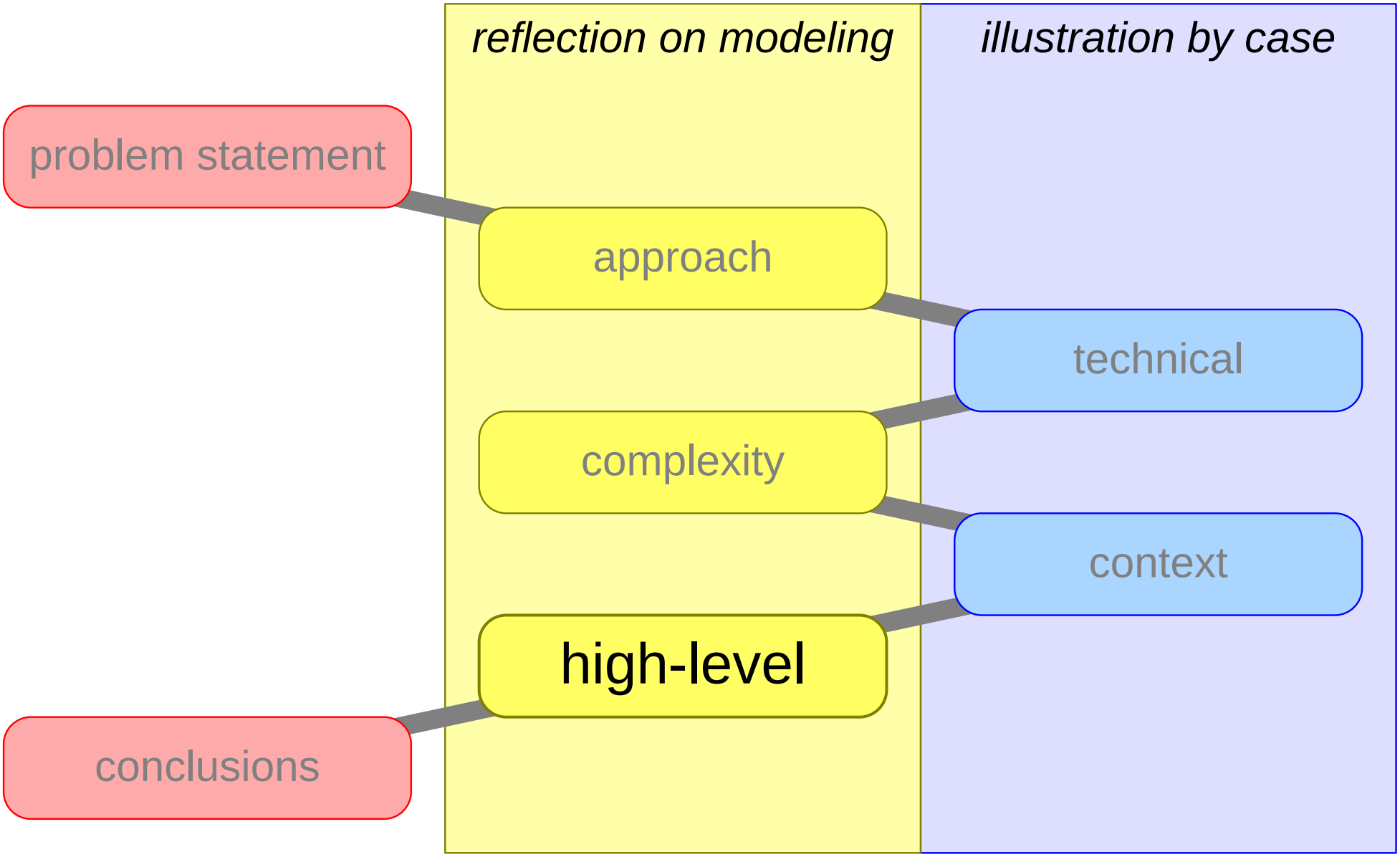


Web Shop Reliability and Changes

new faults = average fault density * #changes

$$\#\text{errors} = \sum_{\text{faults}} f(\text{severity}, \text{hit probability}, \text{detection probability})$$

	severity	hit probability	detection probability
Jansen iso *Janssen*	low	high	low
operator iso *sales repr*	high	high	medium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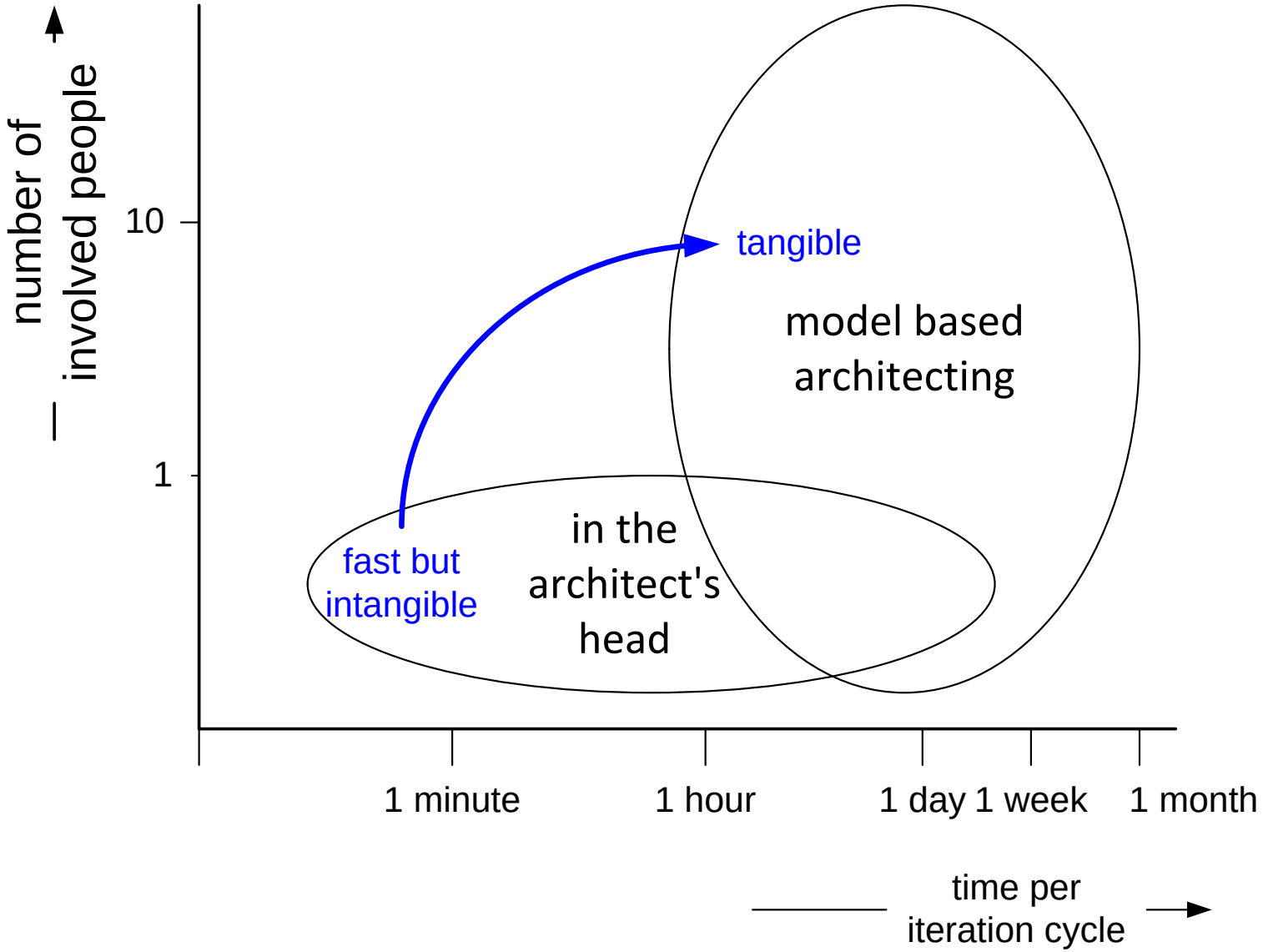
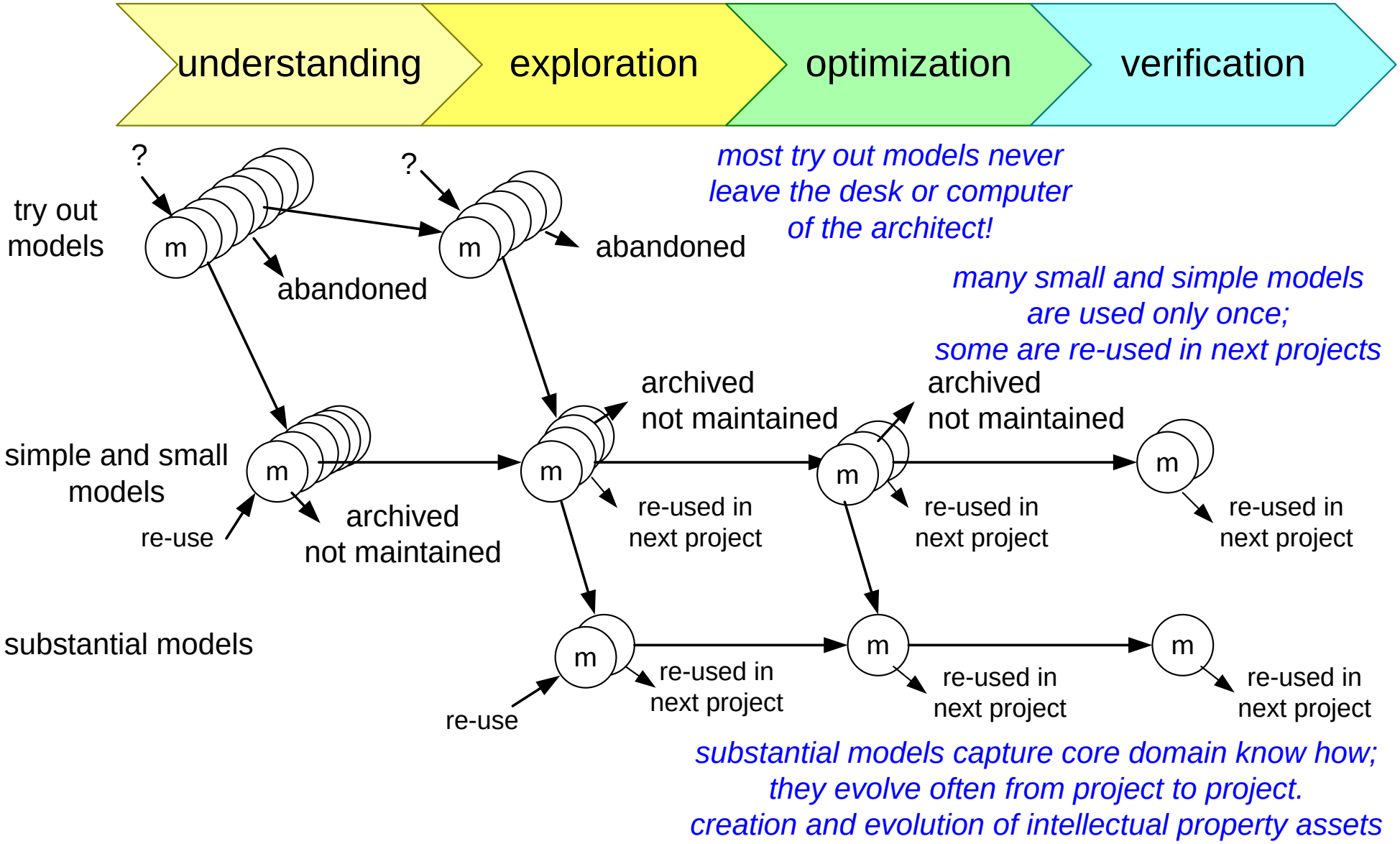
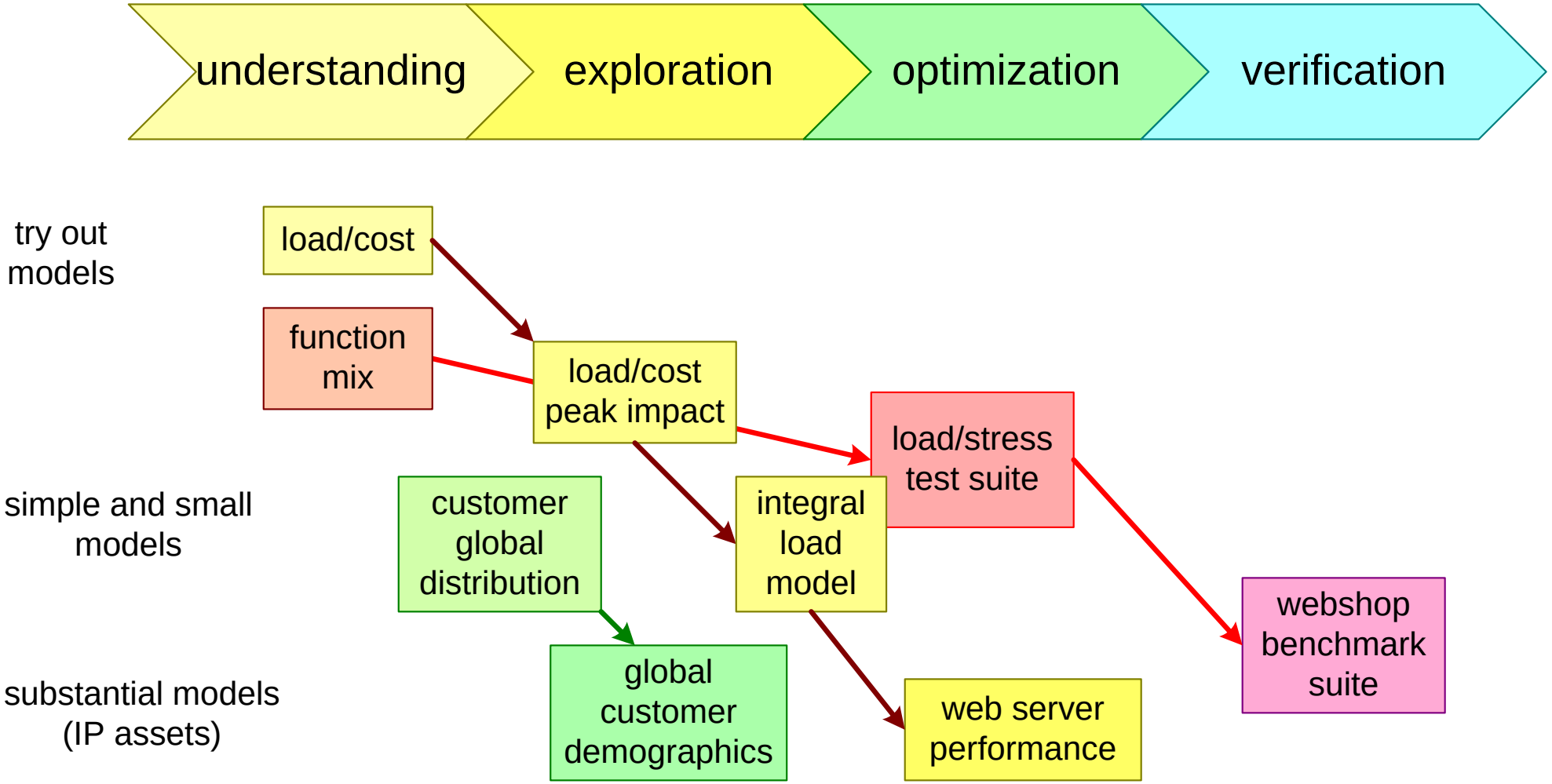
High Level Models Support Communication

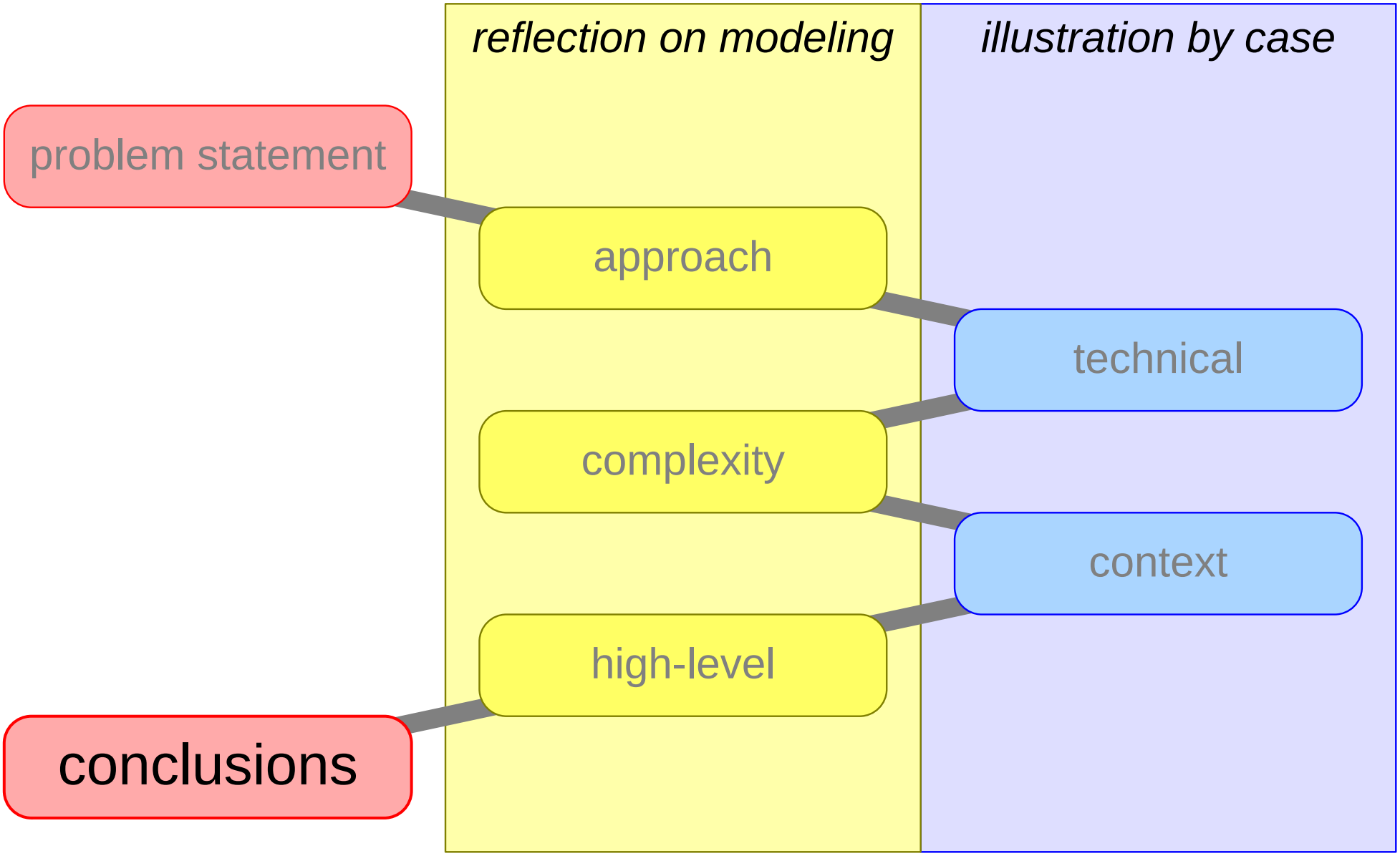


Model Life Cycle



Example Model Life Cycle

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Conclusions

lack of integral understanding

of software in human and business context

causes horrendous failure rate of IT projects and systems

simple high-level models

create understanding across specialties

and stimulate fact based decision making