

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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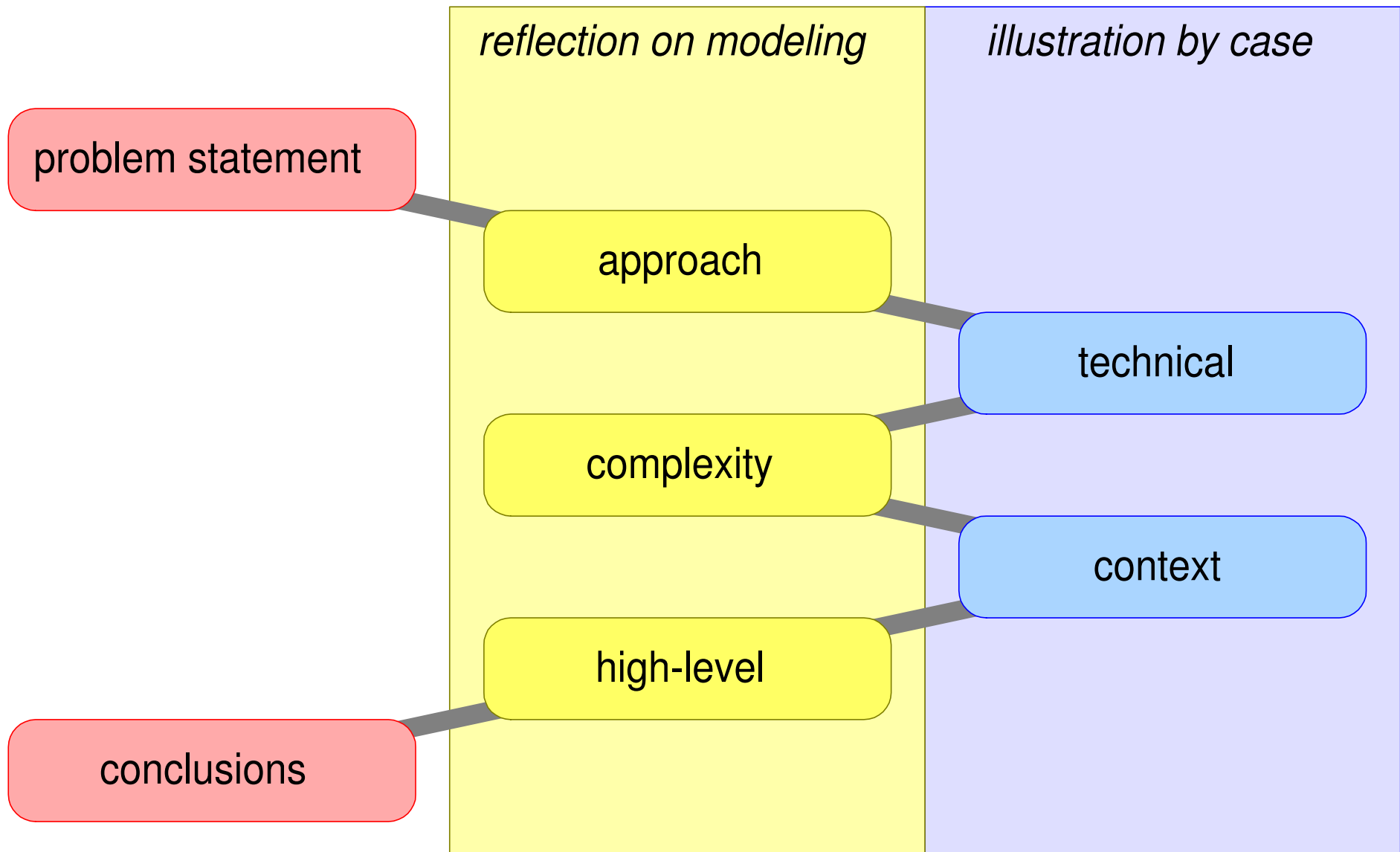
July 20, 2011

status: preliminary

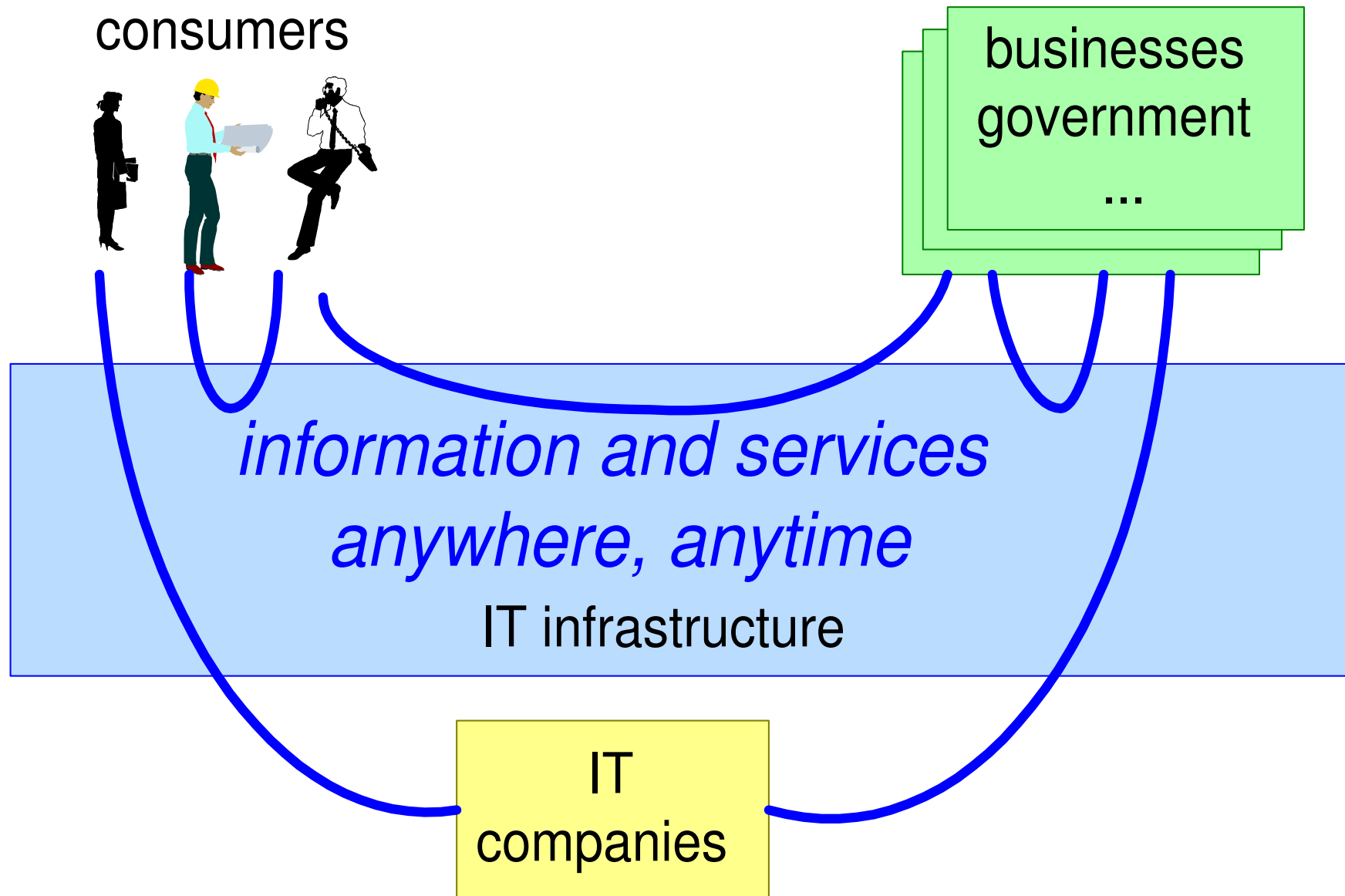
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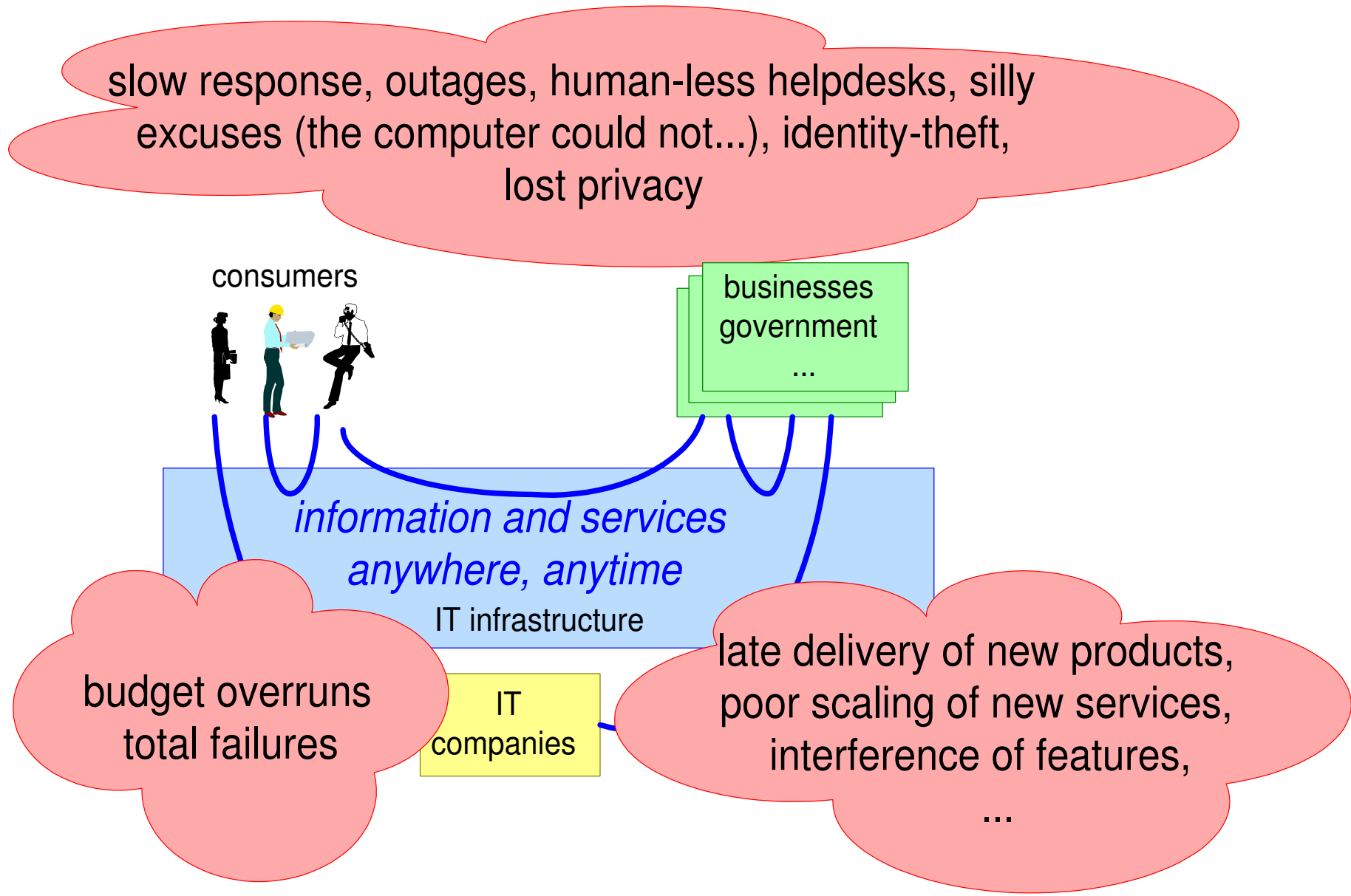
Figure Of Contents™



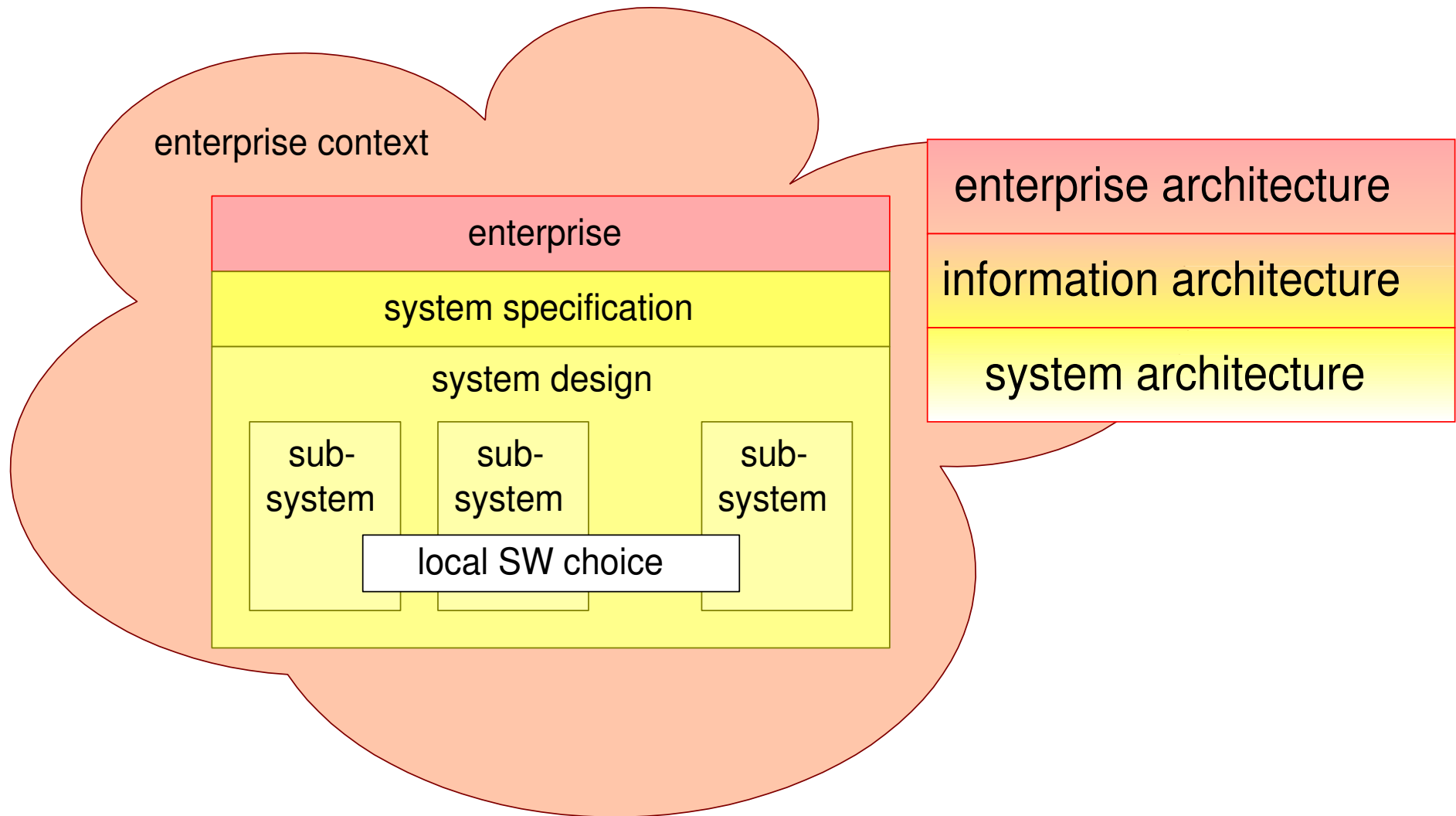
Ubiquitous Information and Services

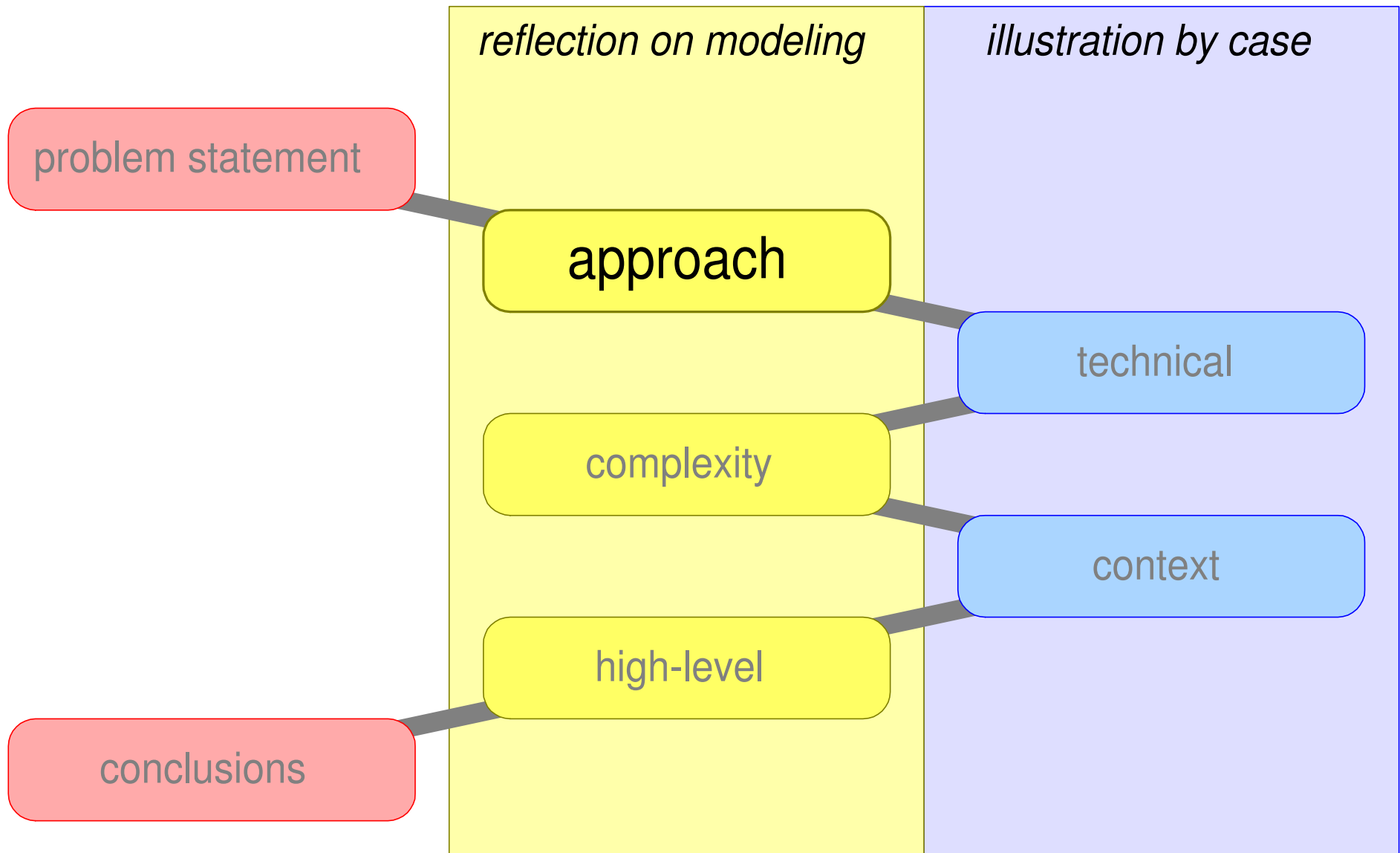


But, Horrendous Failure Rate

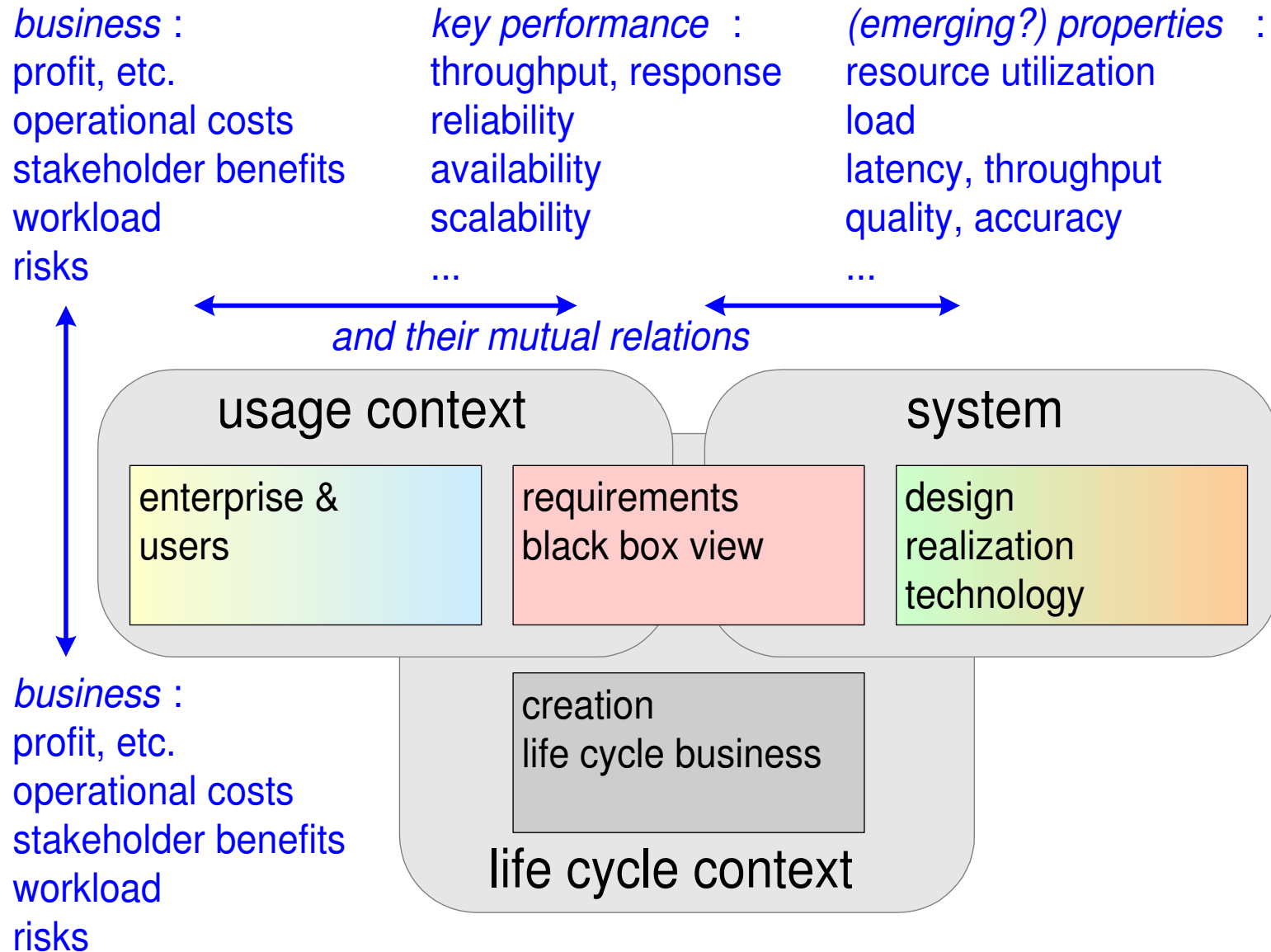


Typical Architecture Levels in IT

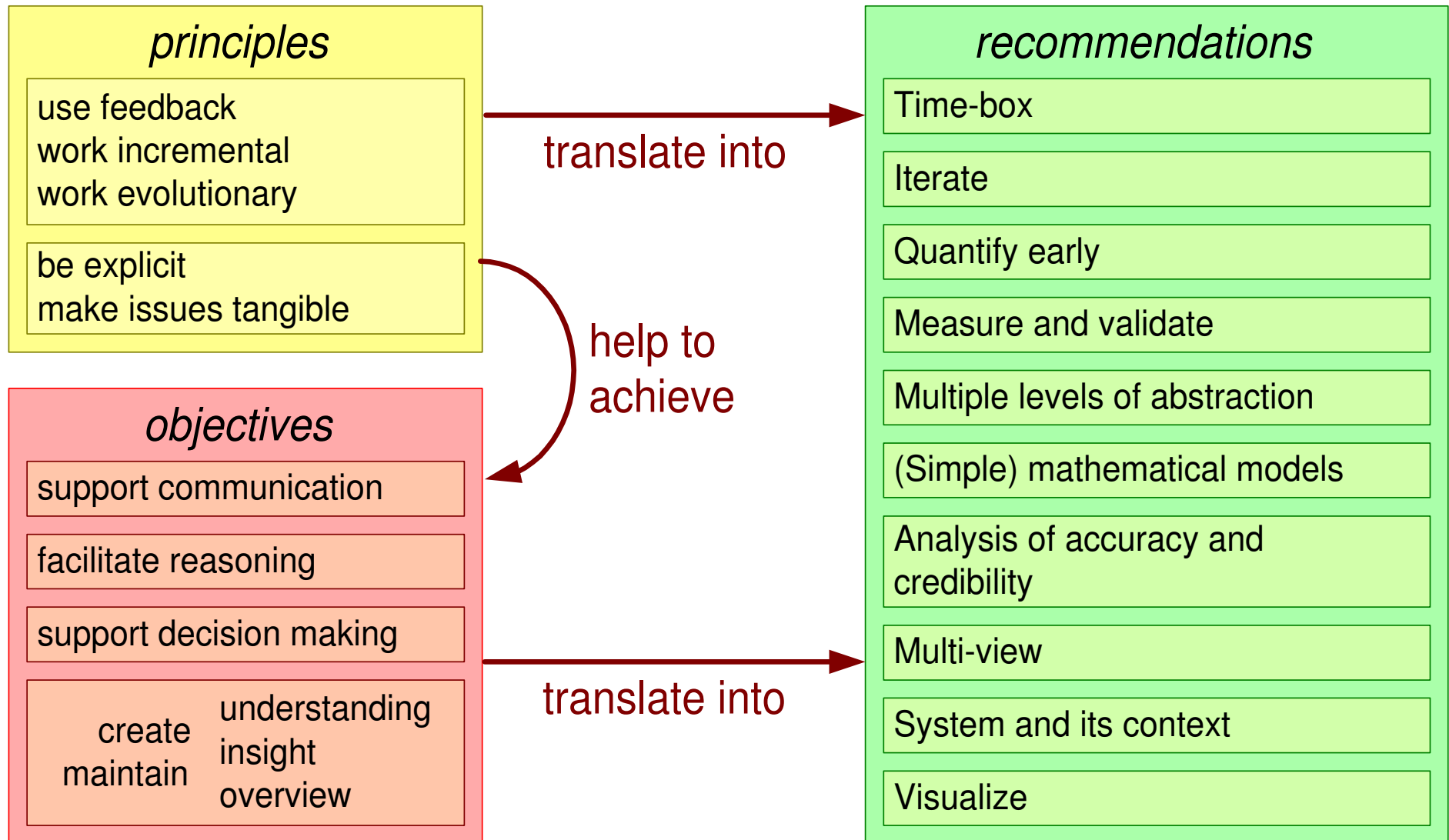


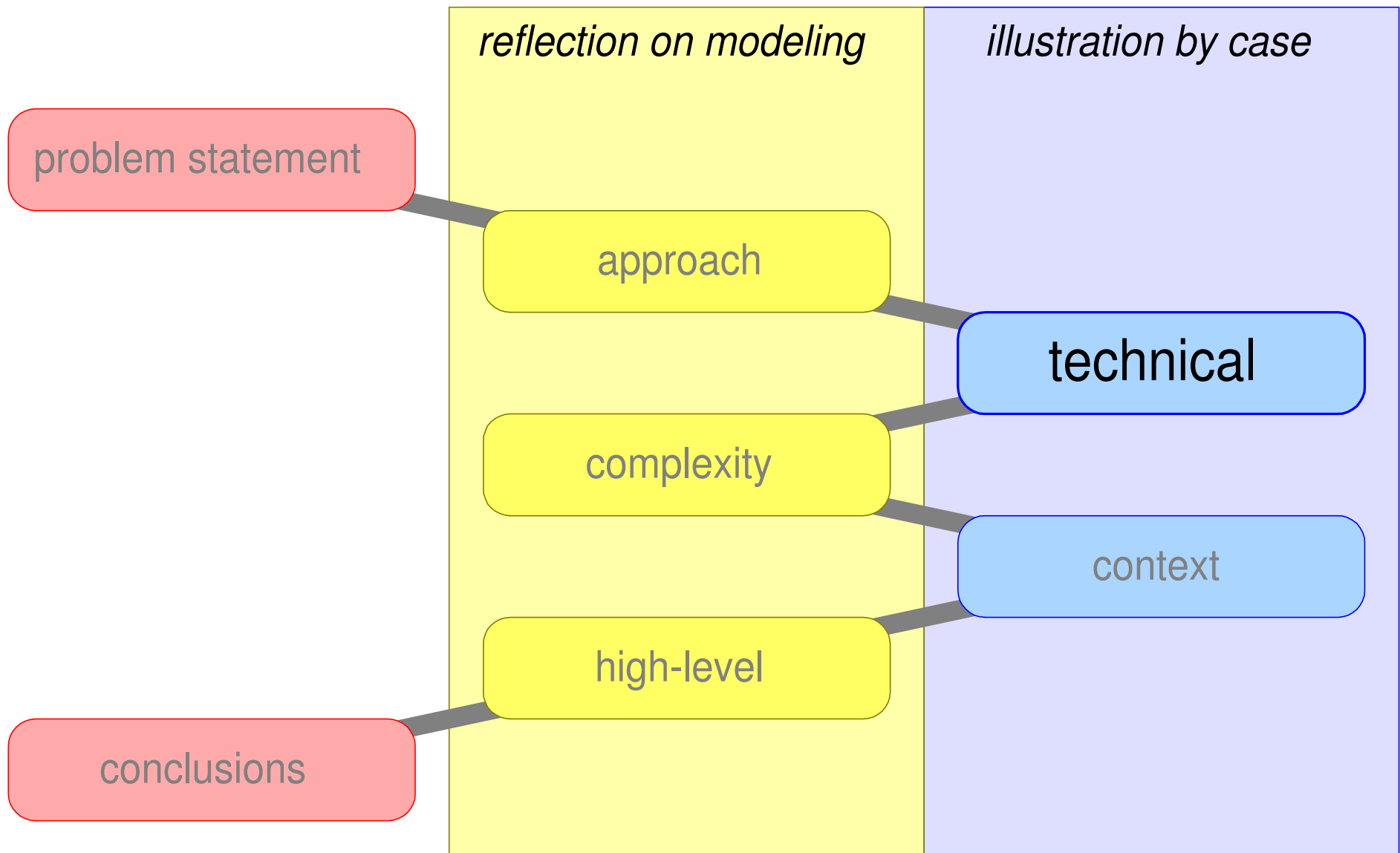


Simplified Framework for Modeling

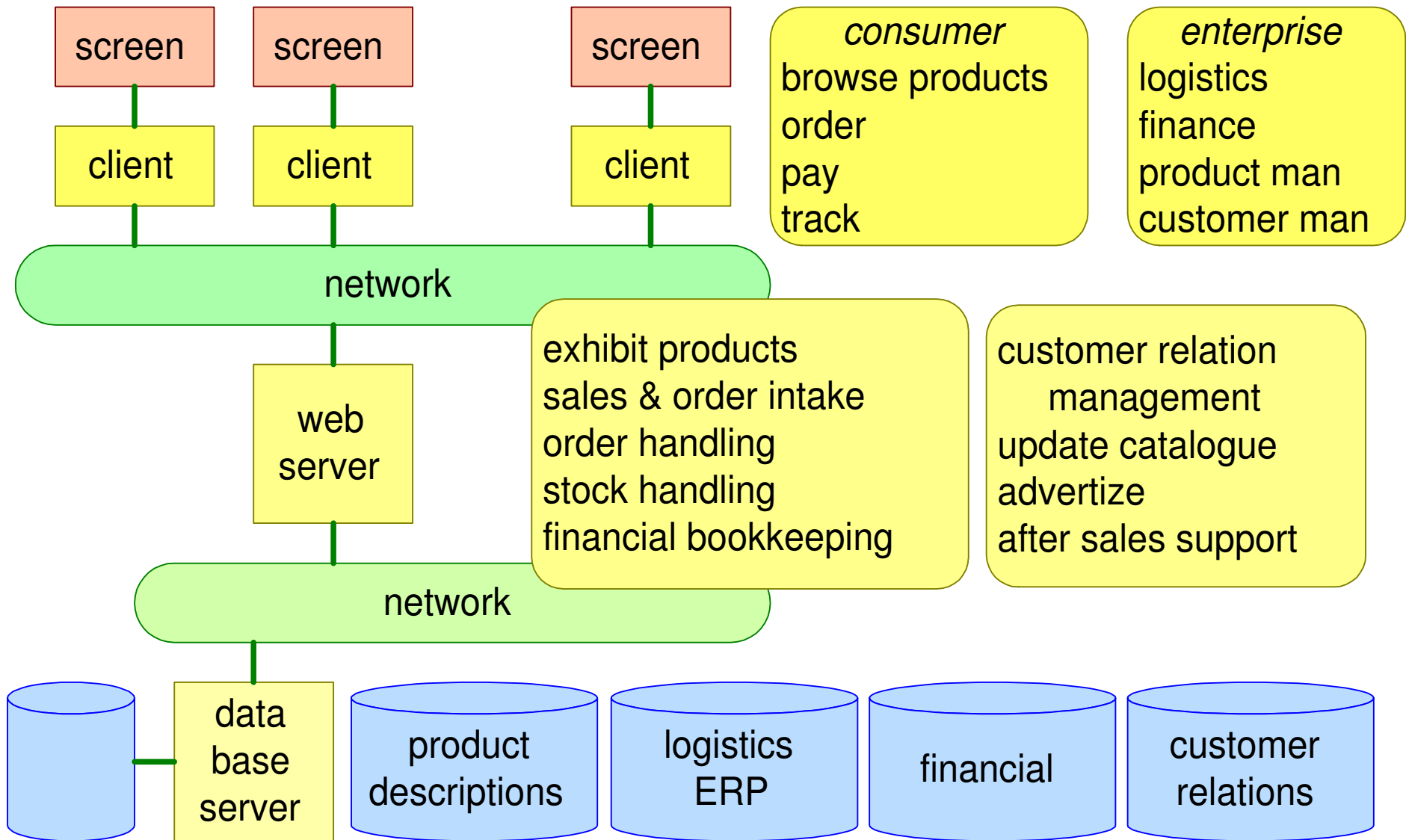


Recommendations for Modeling

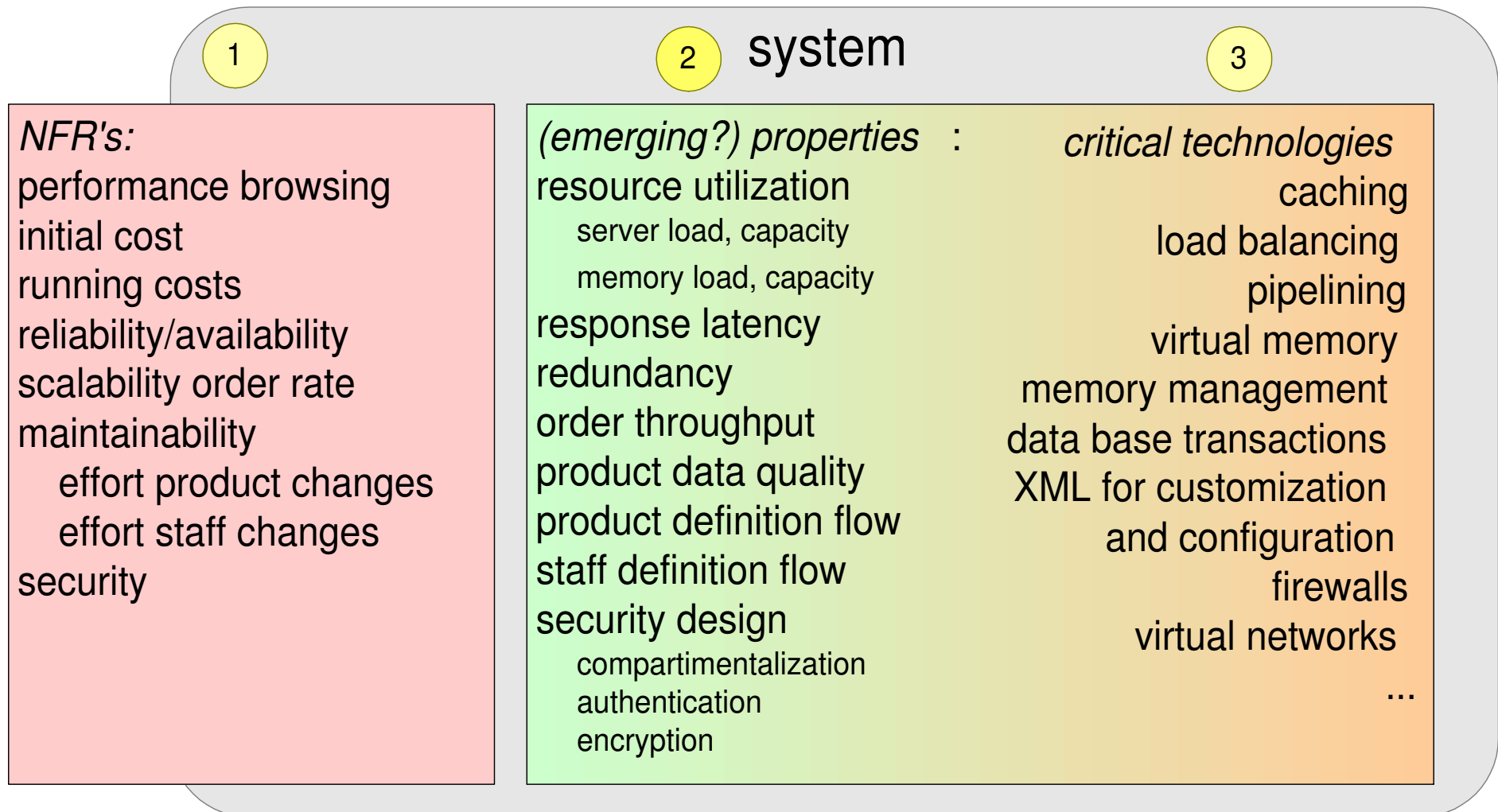




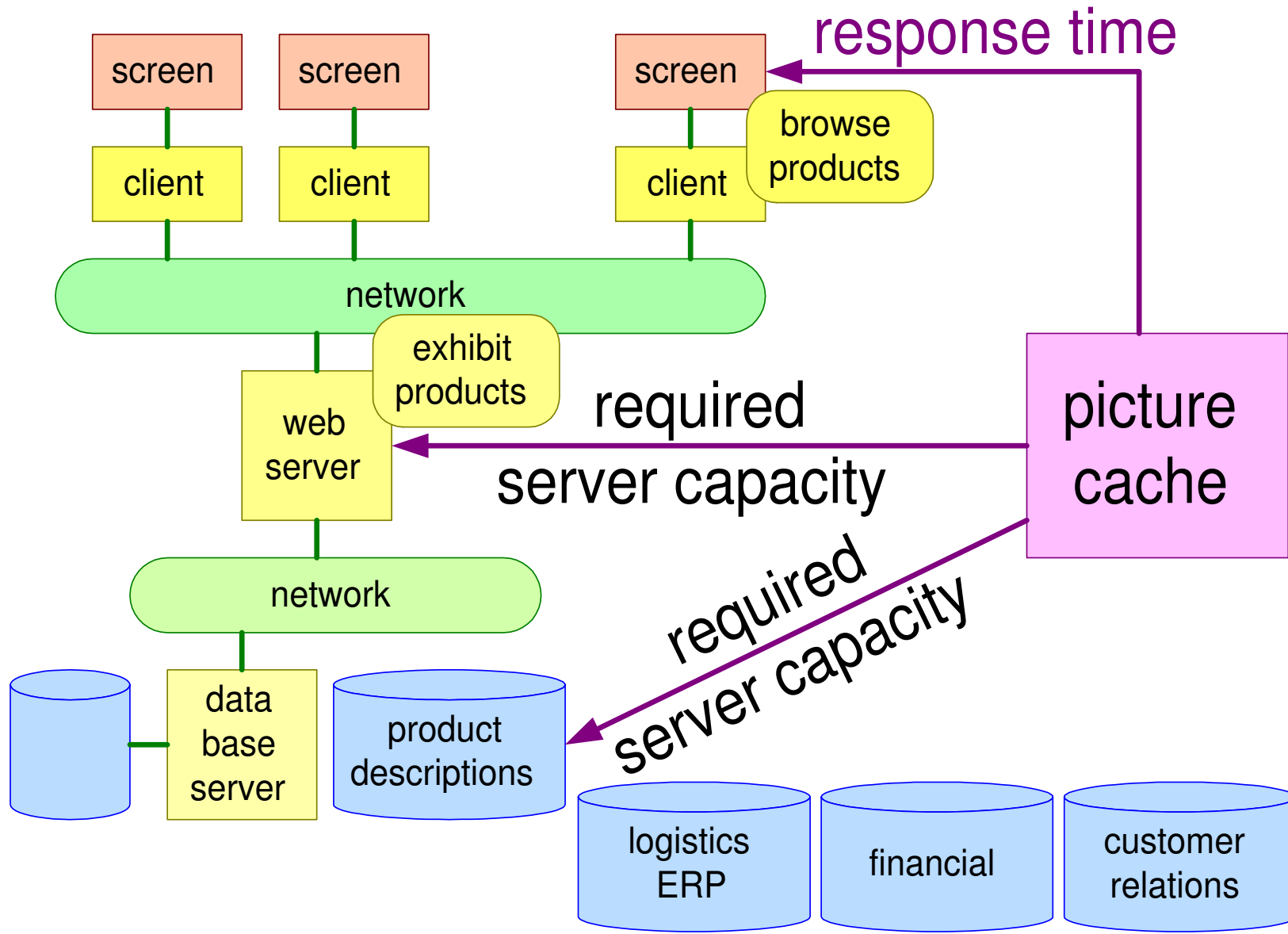
Example Web Shop

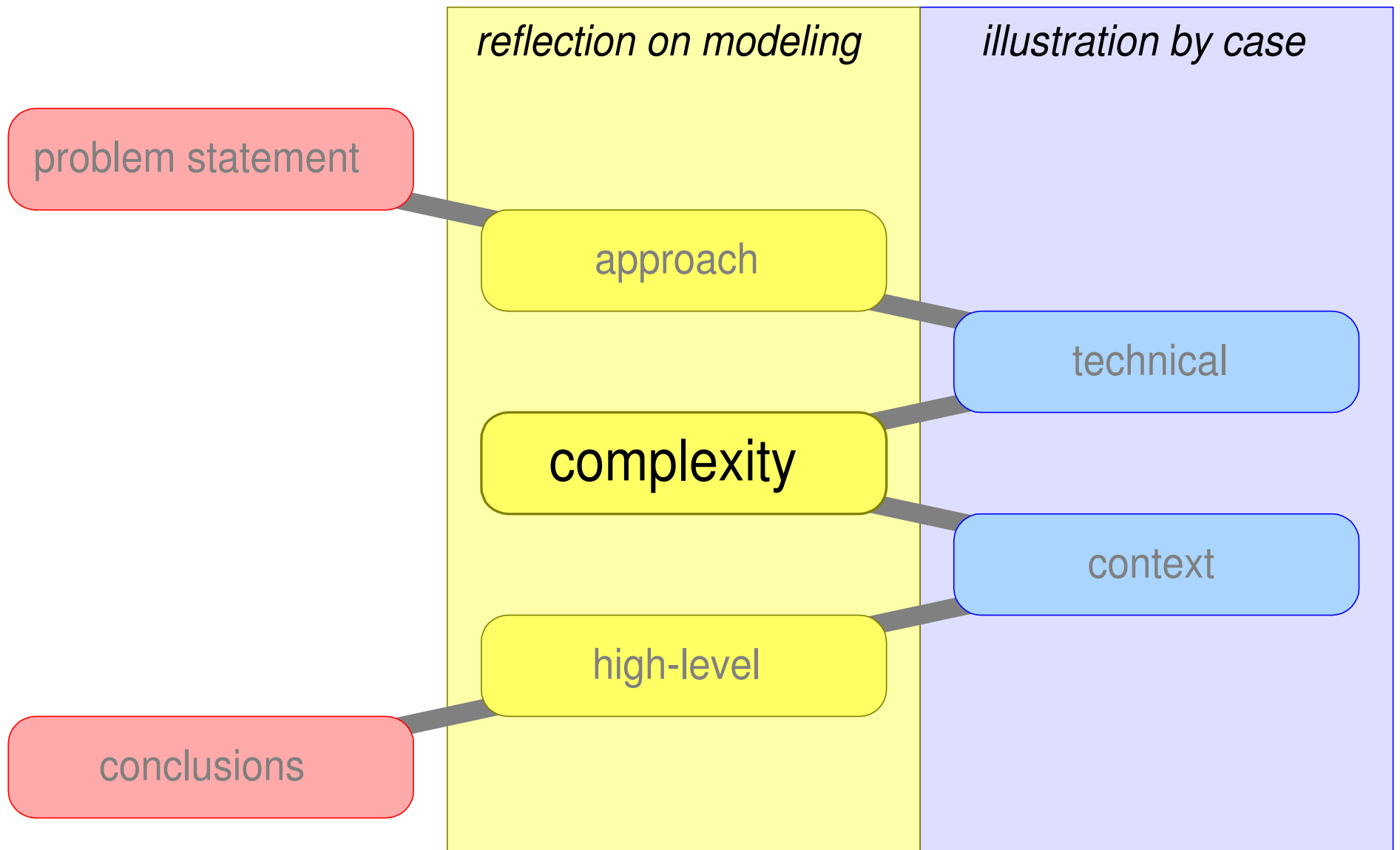


Web Shop: NFR's, Properties and Critical Technologies

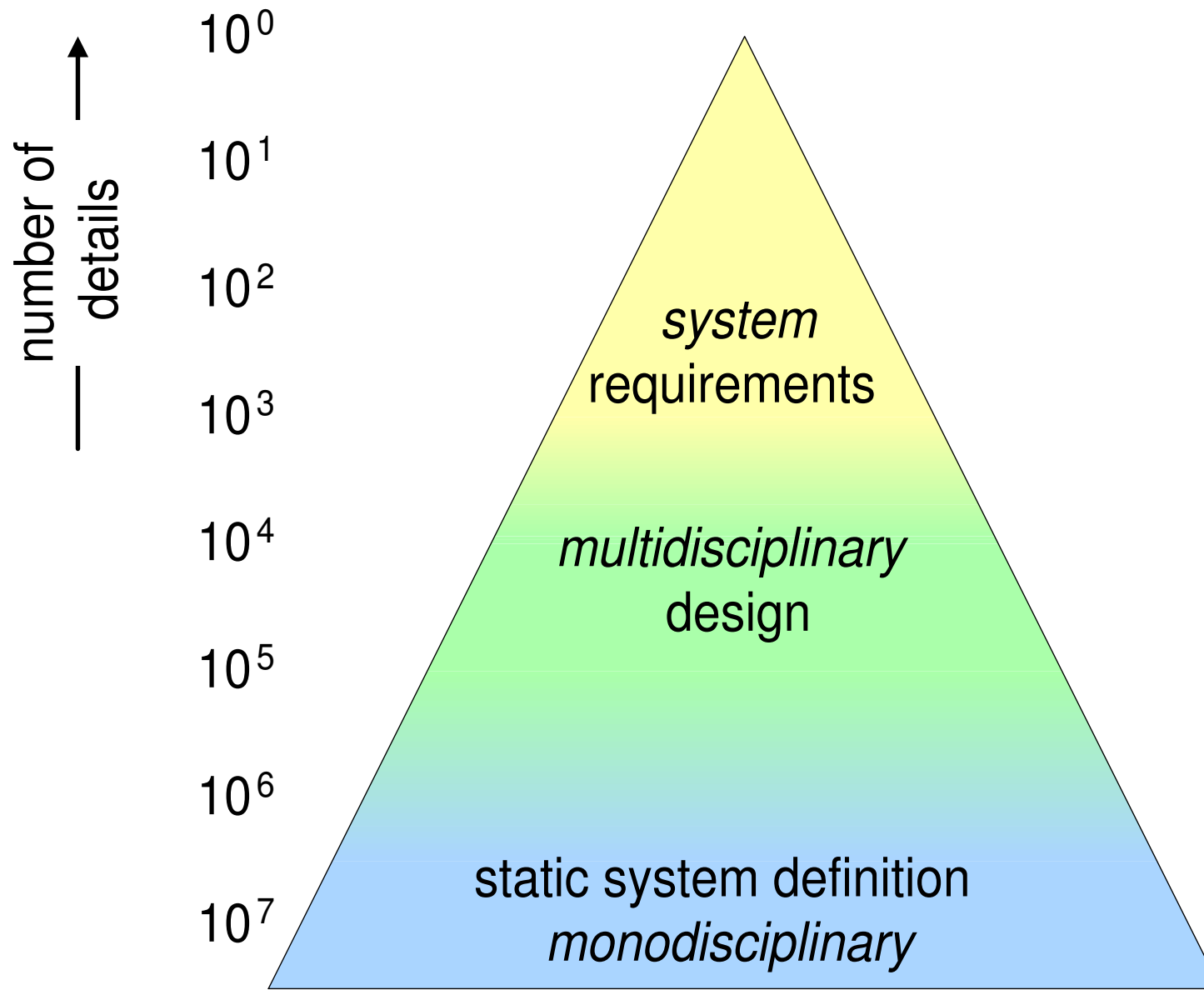


Purpose of Picture Cache Model in Web Shop Context

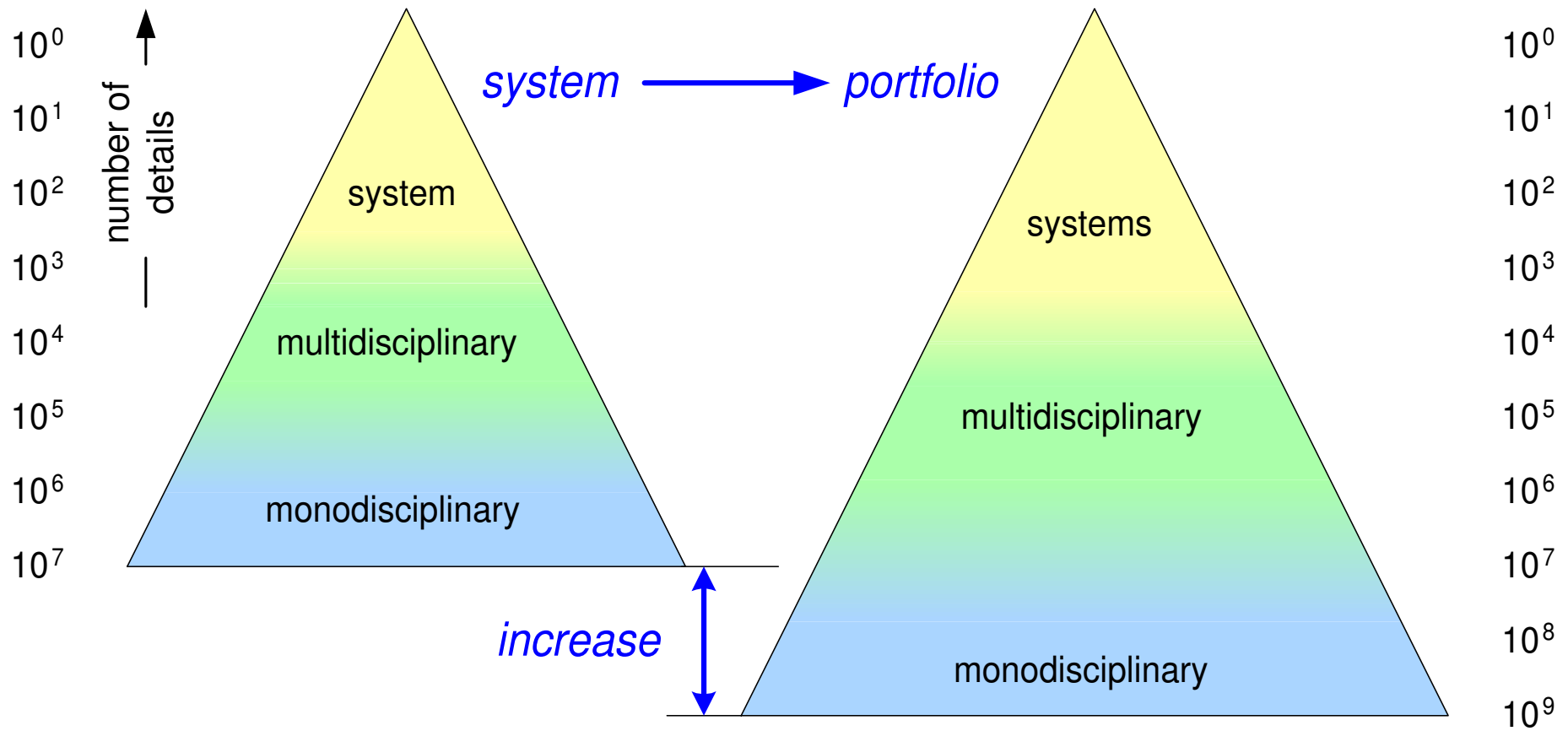




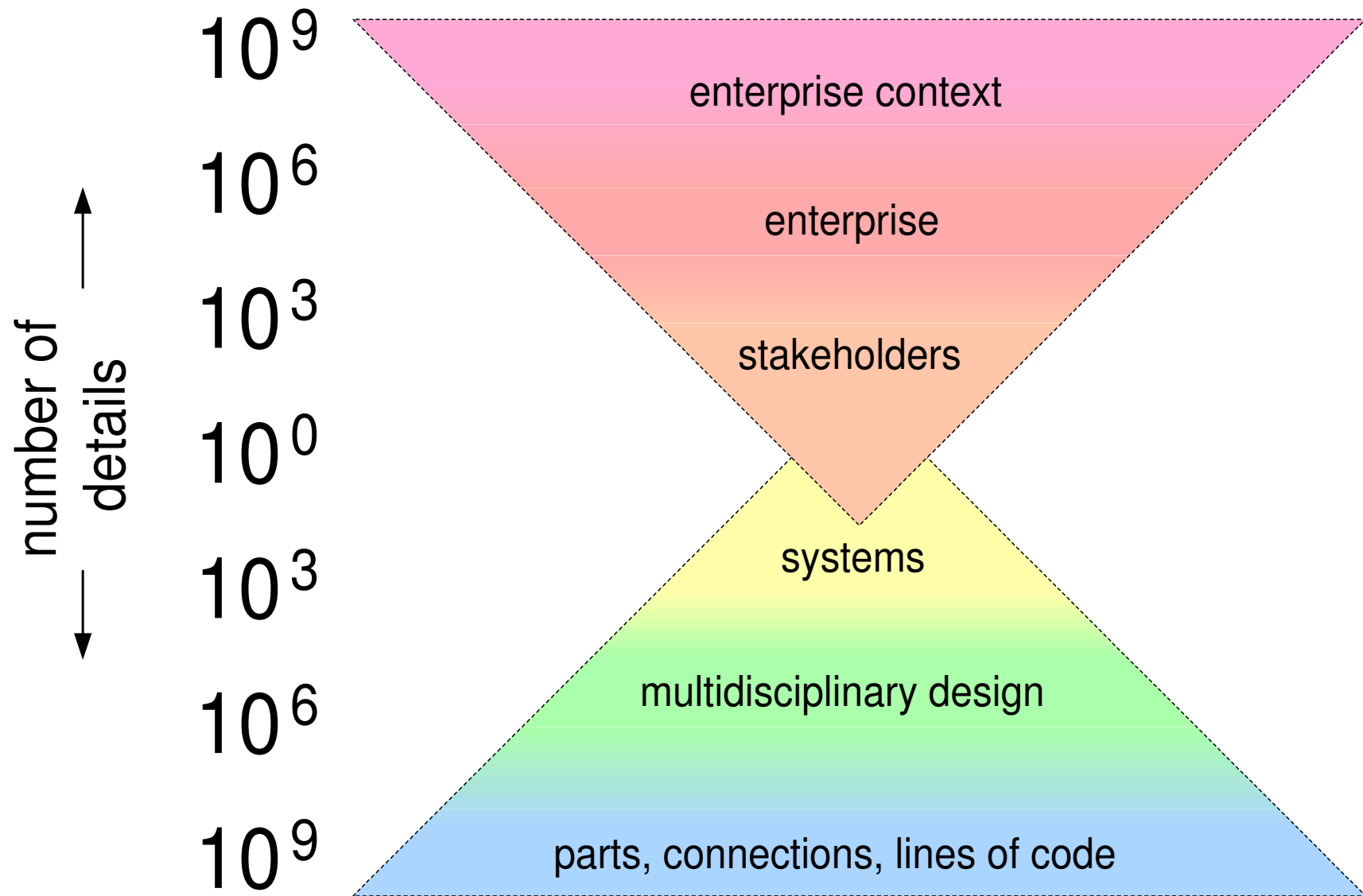
Level of Abstraction Single System



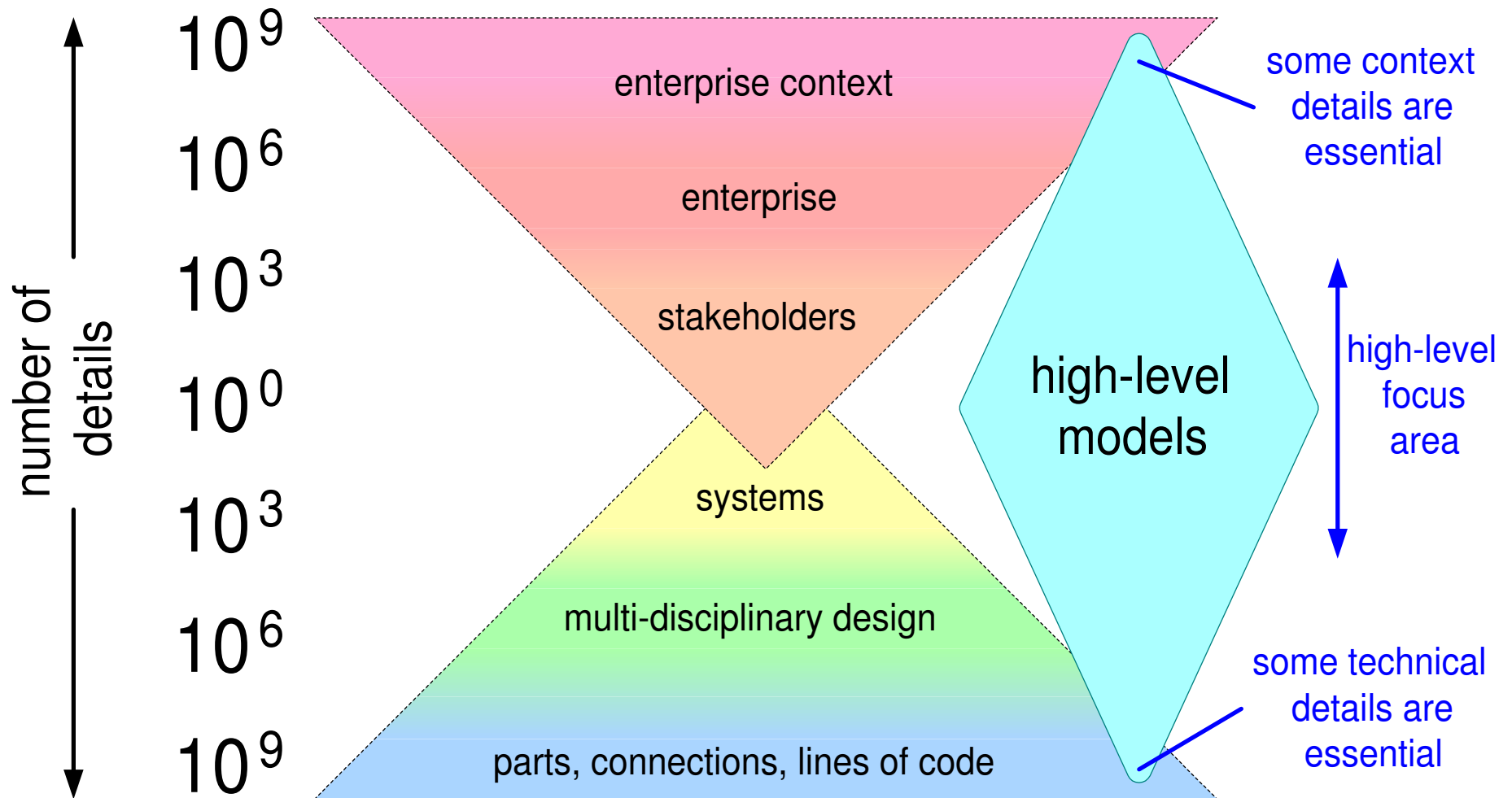
From system to Product Family or Portfolio

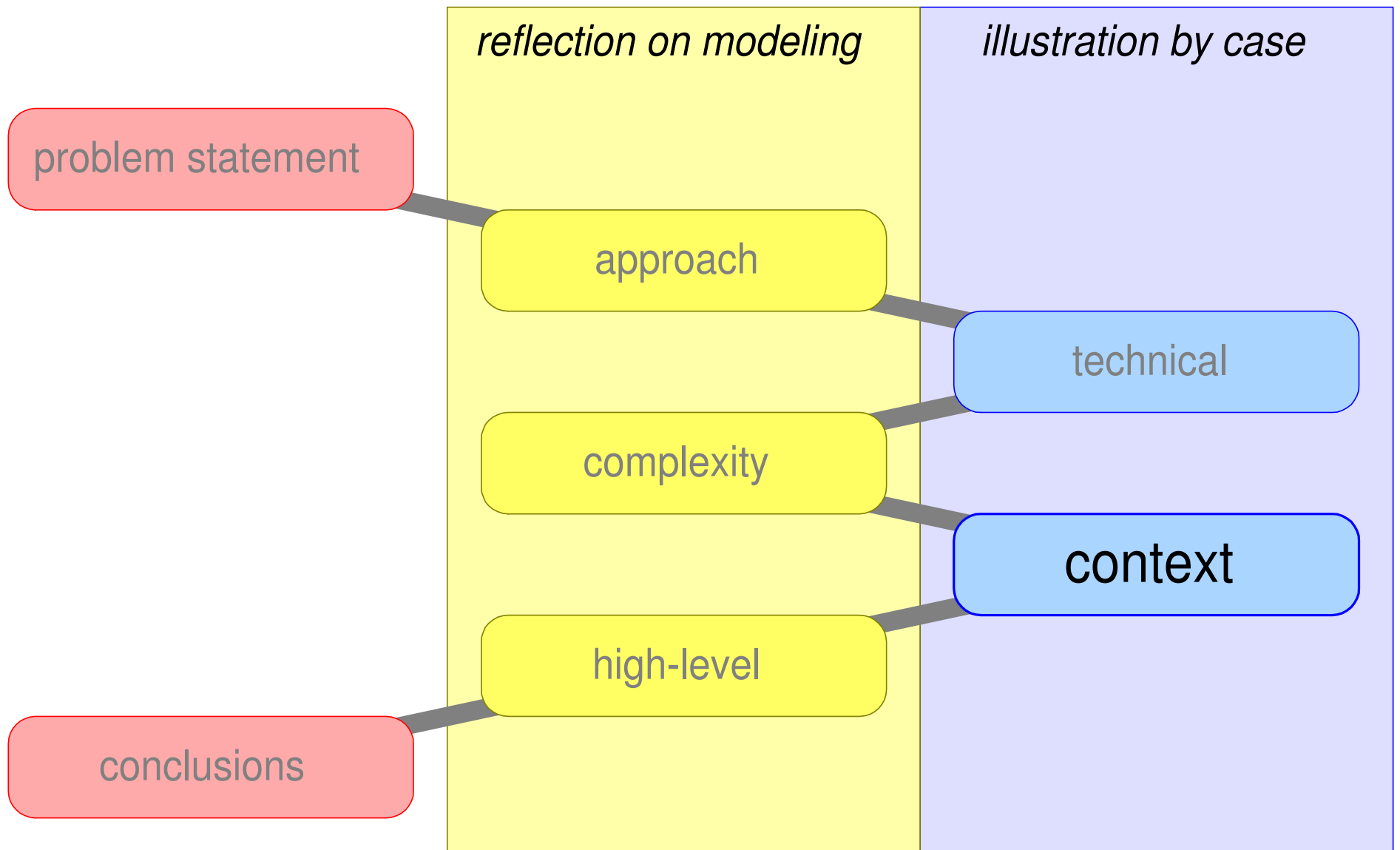


Product Family in Context

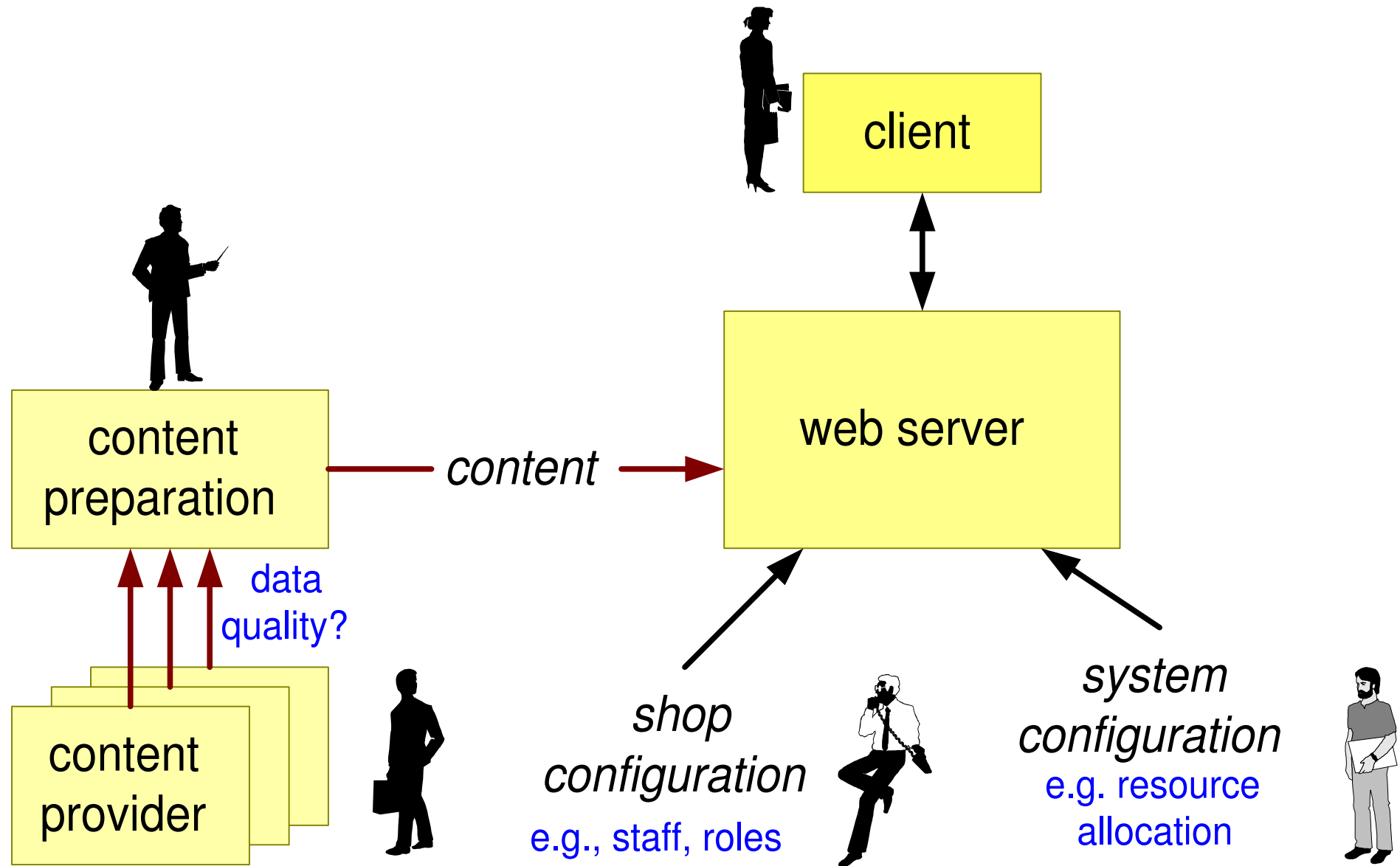


RA: Capturing the Essence

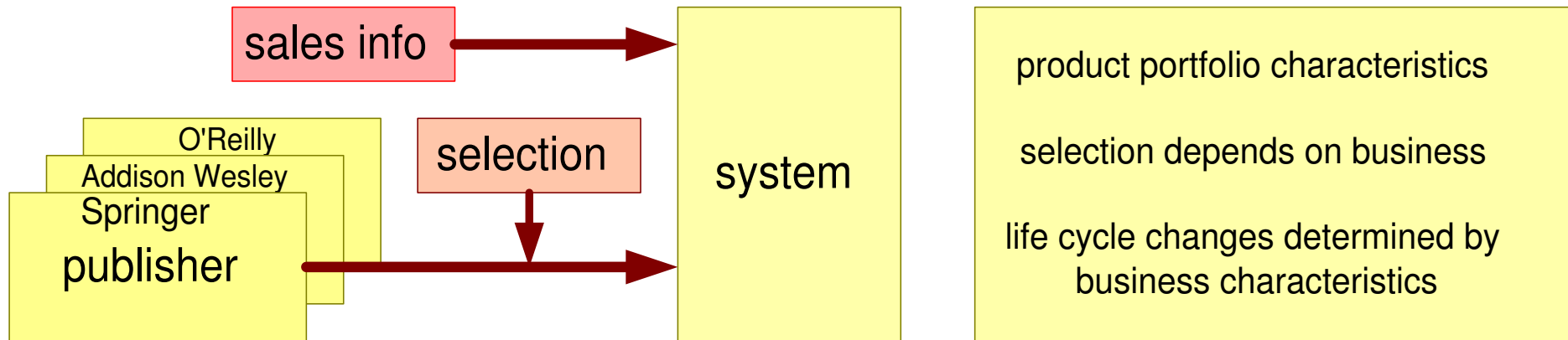




Data Sources of Web Server



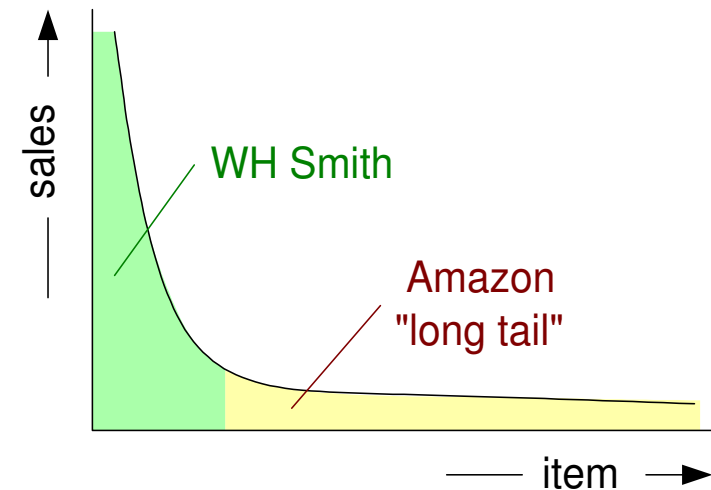
Example Product Portfolio Change Books



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

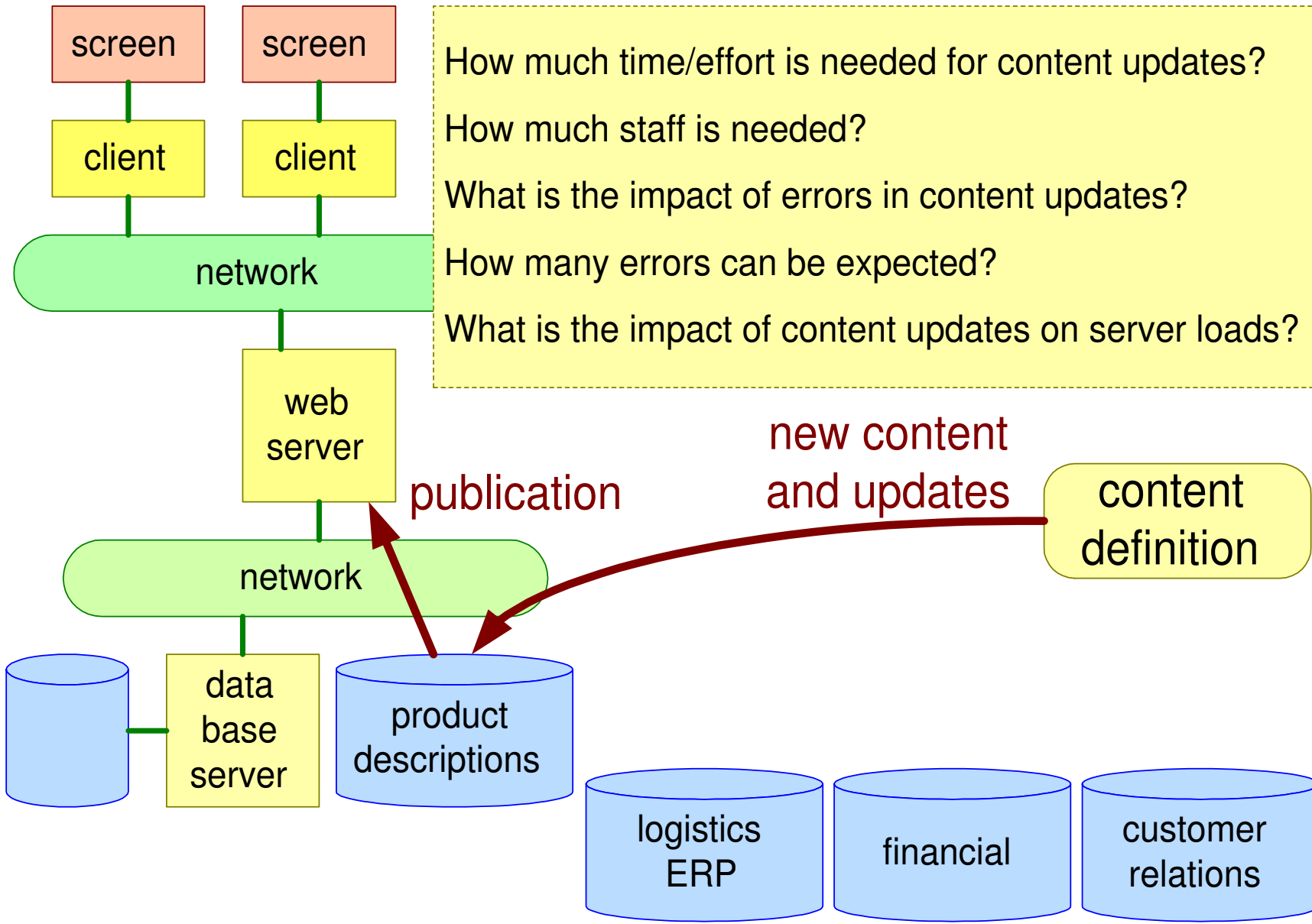
What is the expected growth of # customers?

What is the impact on system and infrastructure?

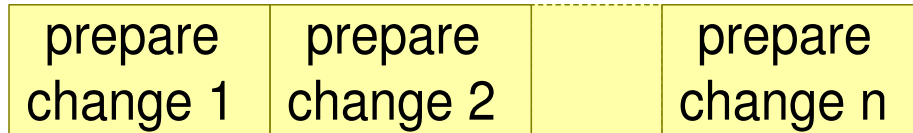
What is the impact on CRM (Customer Relation Management) ?

What is the impact on customer, sales support staff?

Web Shop Content Update



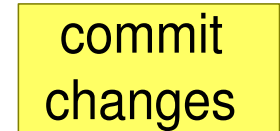
Web Shop Content Change Effort



review input
select info
layout&cosmetics
check-in



inspect source
inspect result



$$\text{effort}_{\text{changes}} = n_{\text{changes}} * (t_{\text{prepare}} + t_{\text{verify}}) + t_{\text{commit}}$$

$$\#fte = \text{effort}_{\text{changes}} / \text{hours per day}$$

n_{changes} per day	10	100	1000
$\text{effort}_{\text{changes}}$	1 uur	10 uur	100 uur
#fte	0.1	1	12

with $t_{\text{prepare}} = 4 \text{ min}$

$t_{\text{verify}} = 2 \text{ min}$

$t_{\text{commit}} = 1 \text{ min}$

hours per day = 8 hours

Example of Client Level Changes

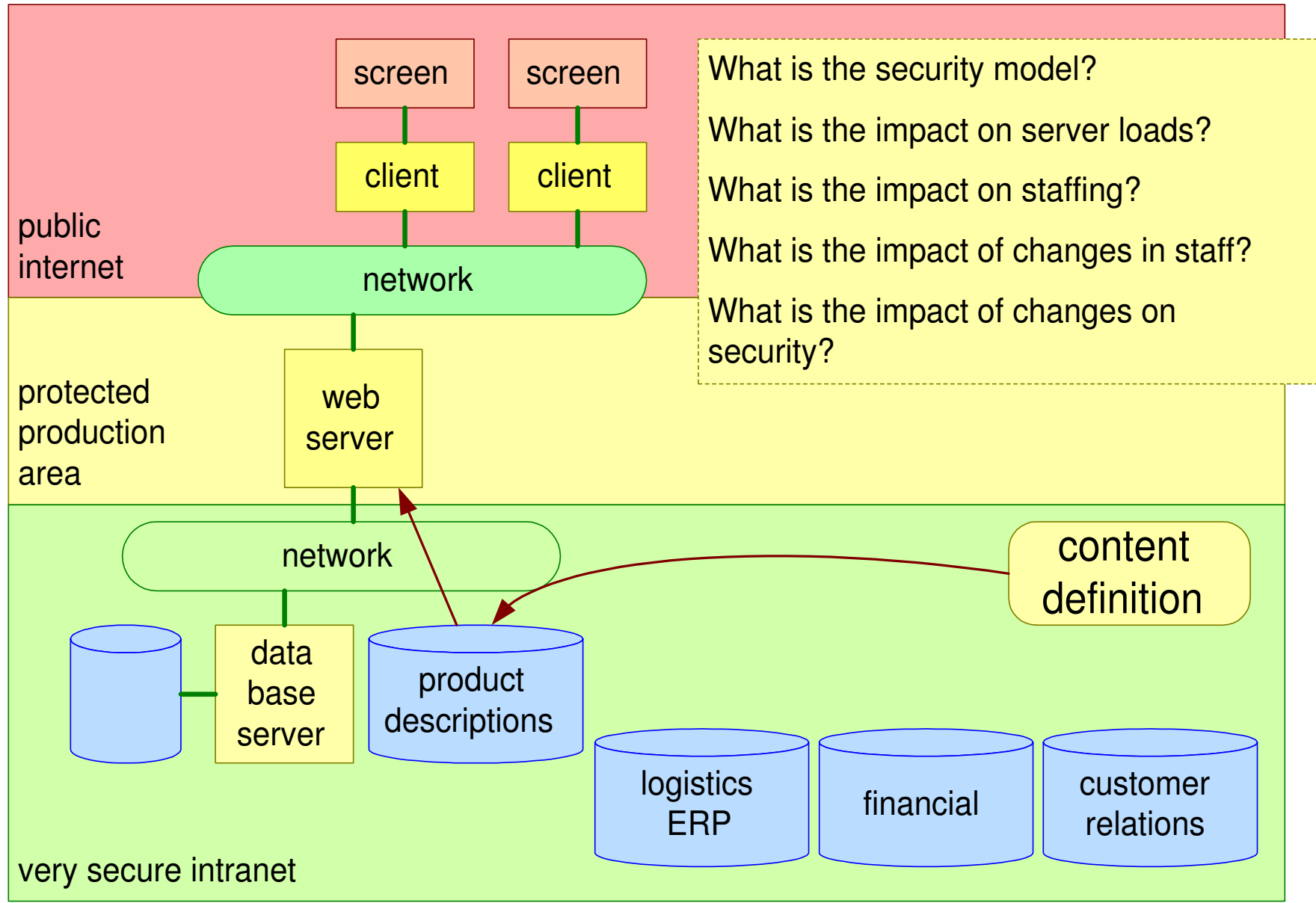
The image shows a screenshot of the Amazon.com website in a Mozilla Firefox browser window. The browser's address bar shows the URL <http://www.amazon.com/>. The search bar at the top contains the text "Amazon.com".

Yellow callout boxes highlight the following elements:

- main access through search**: Points to the search bar at the top of the page.
- personalization**: Points to the text "Hello. Sign in to get personalized recommendations. New customer? Start here." below the search bar.
- catalogue entries**: Points to the left-hand navigation menu with categories like "Books, Music & Movies", "Clothing & Accessories", "Computer & Office", "Consumer Electronics", "Food & Household", "Health & Beauty", and "Home & Garden".
- other advertisements**: Points to the right-hand side of the page, which contains several promotional banners and product recommendations.
- styling: frequently updated, fashion!**: A general comment on the page's design.
- Up-to-date information: Bestsellers What Other Customers Are Looking At Right Now**: Points to the central content area featuring "Books Bestsellers" and "What Other Customers Are Looking At Right Now".
- standard boilerplate**: Points to the footer area containing links for "Directory of All Stores", "Investor Relations", "Press Release", "Careers at Amazon", etc.

snapshot of
www.amazon.com

Web Shop Security and Changes

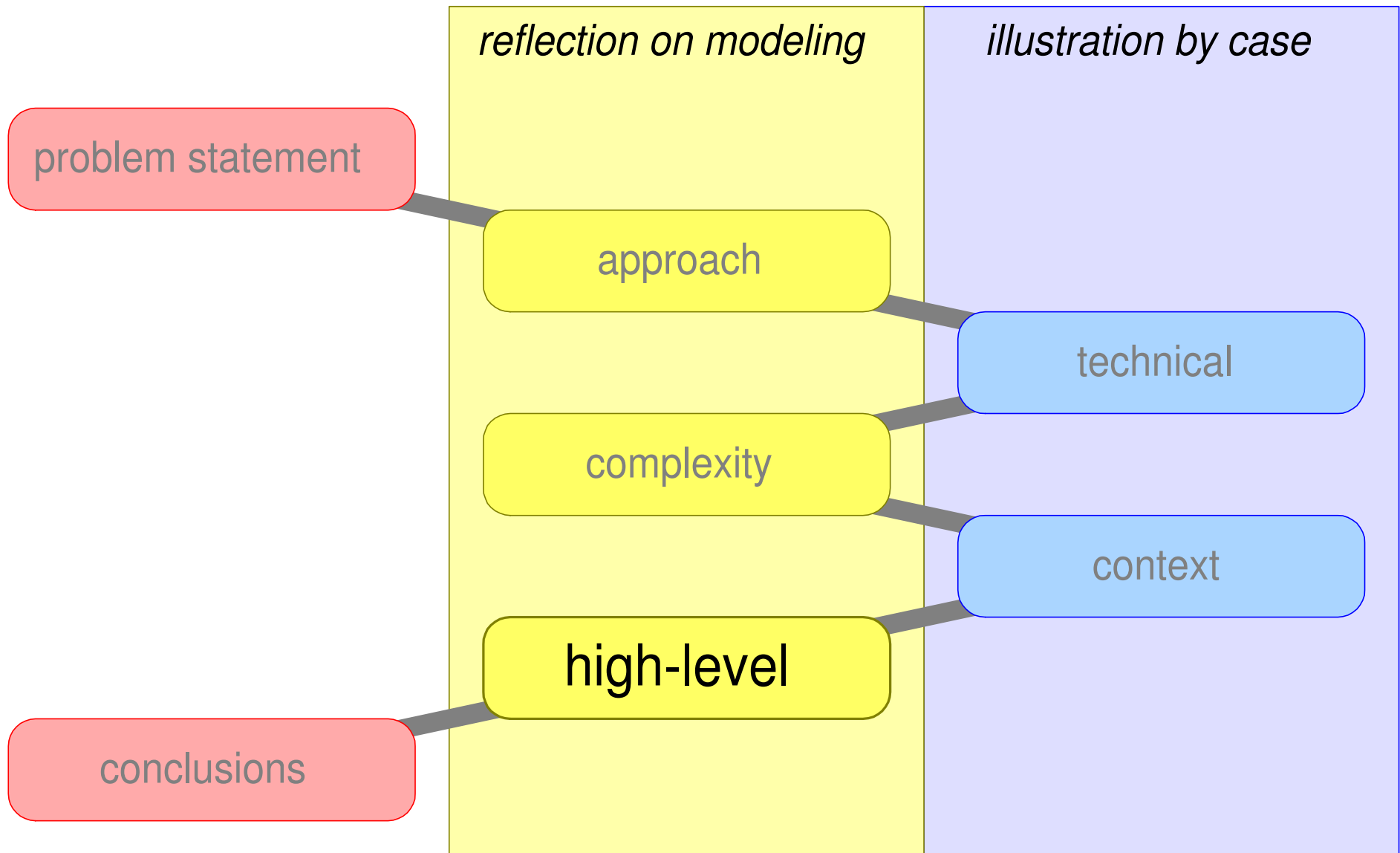


Web Shop Reliability and Changes

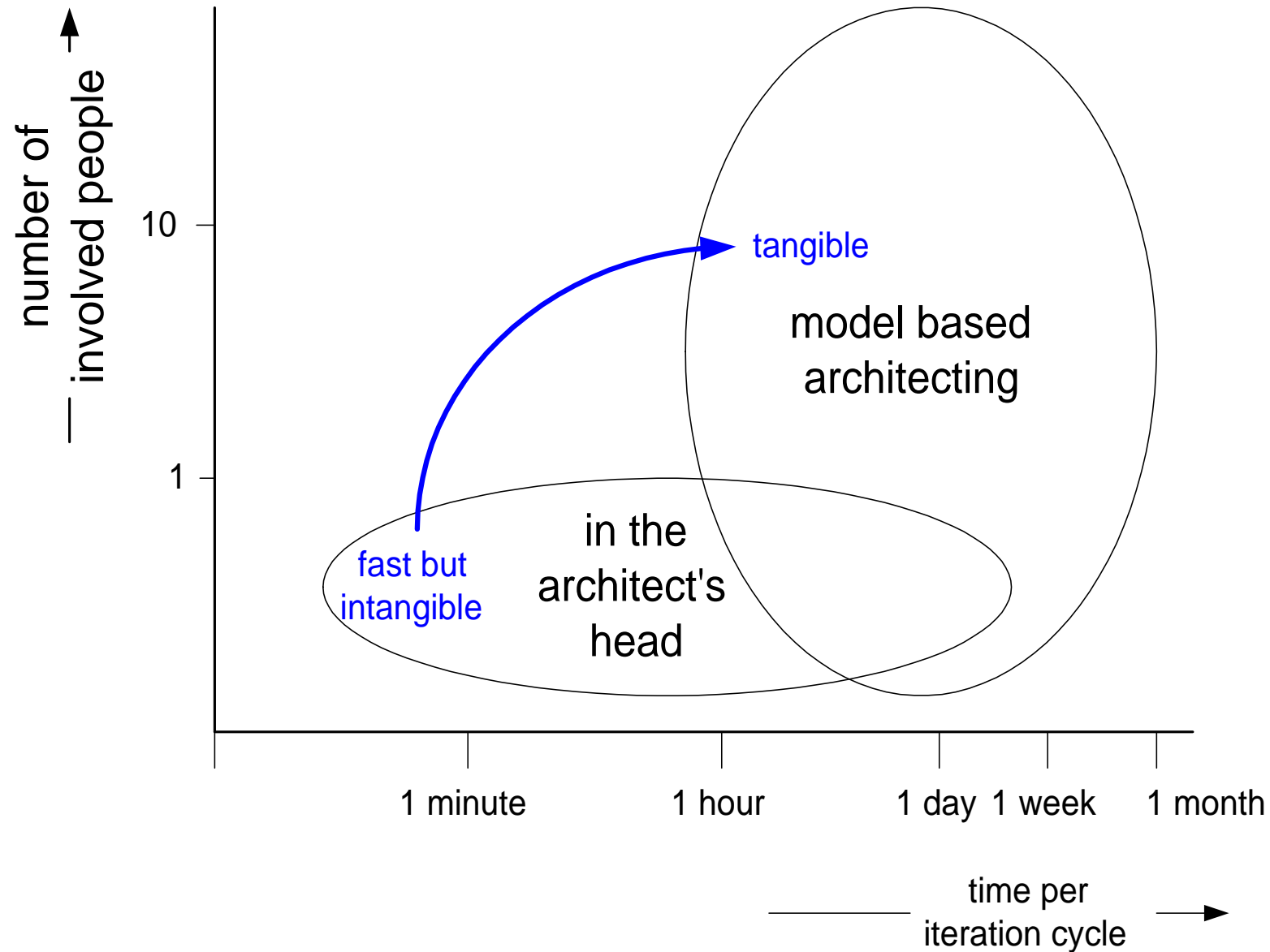
new faults = average fault density * #changes

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

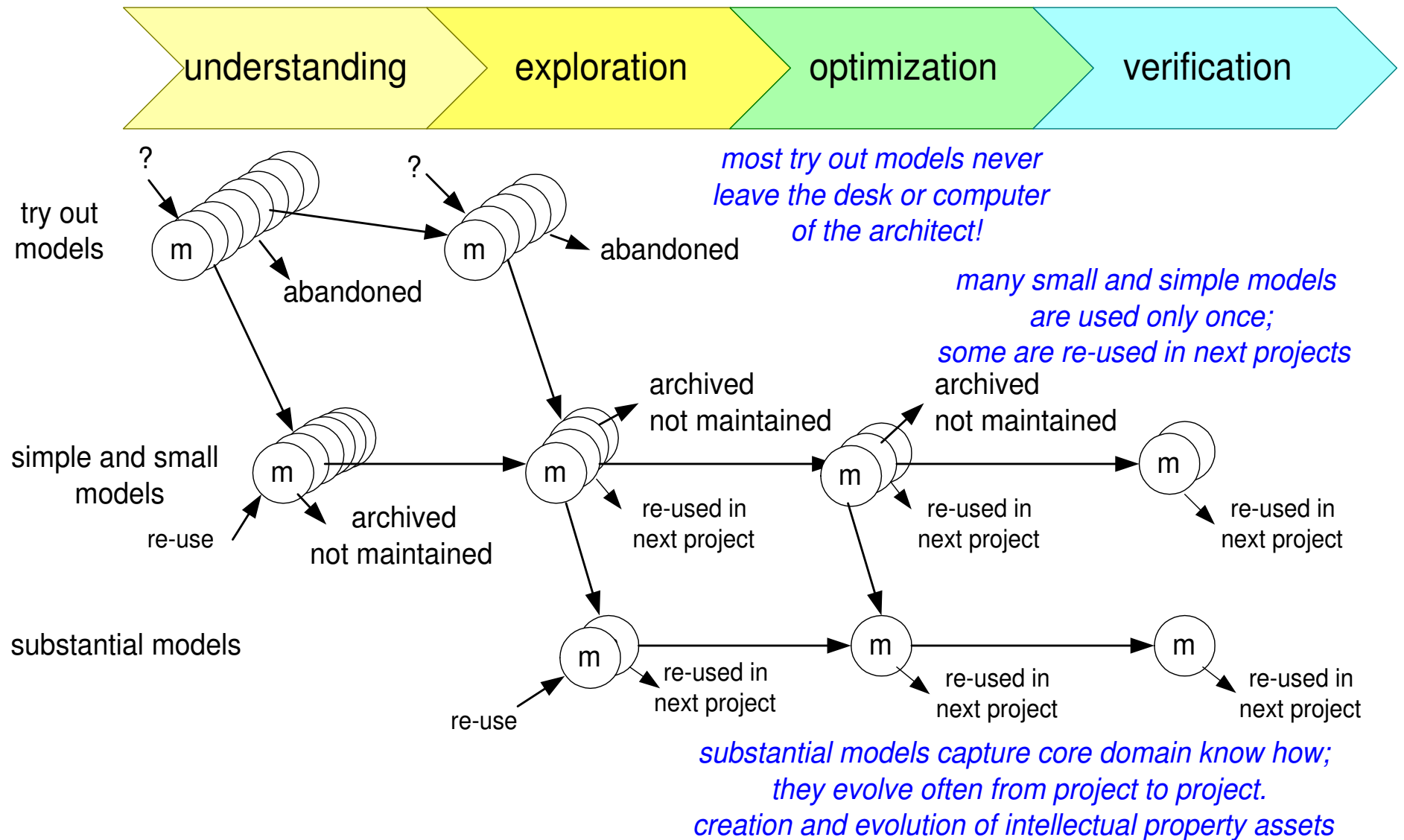
	severity	hit probability	detection probability
<i>Jansen iso Janssen</i>	low	high	low
<i>operator iso sales repr</i>	high	high	medium



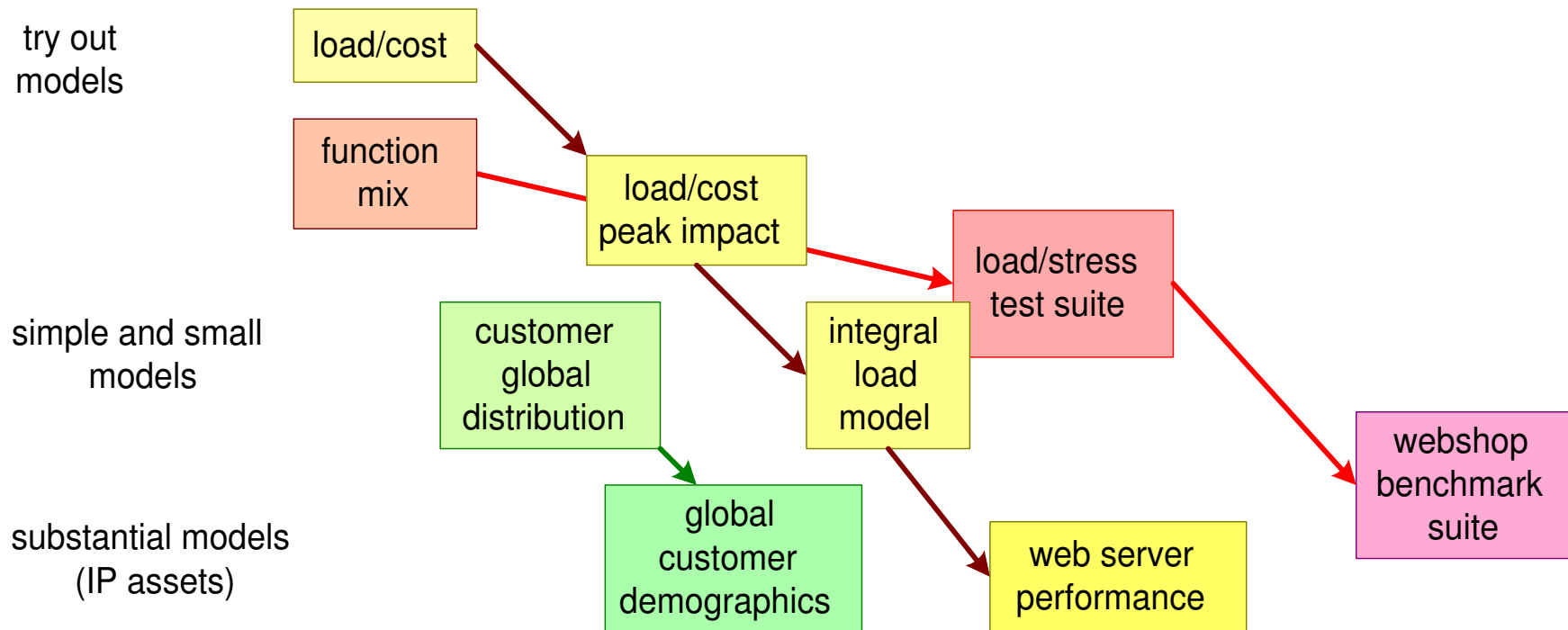
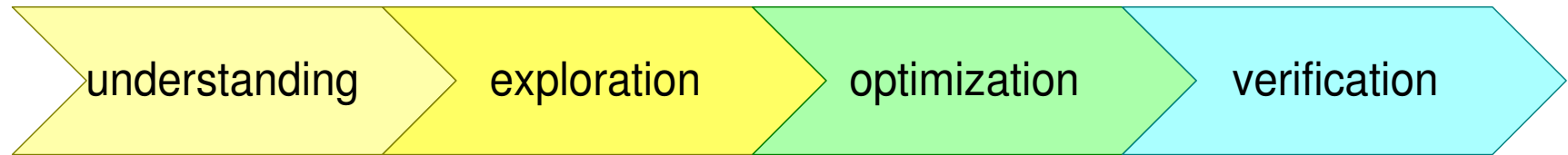
High Level Models Support Communication

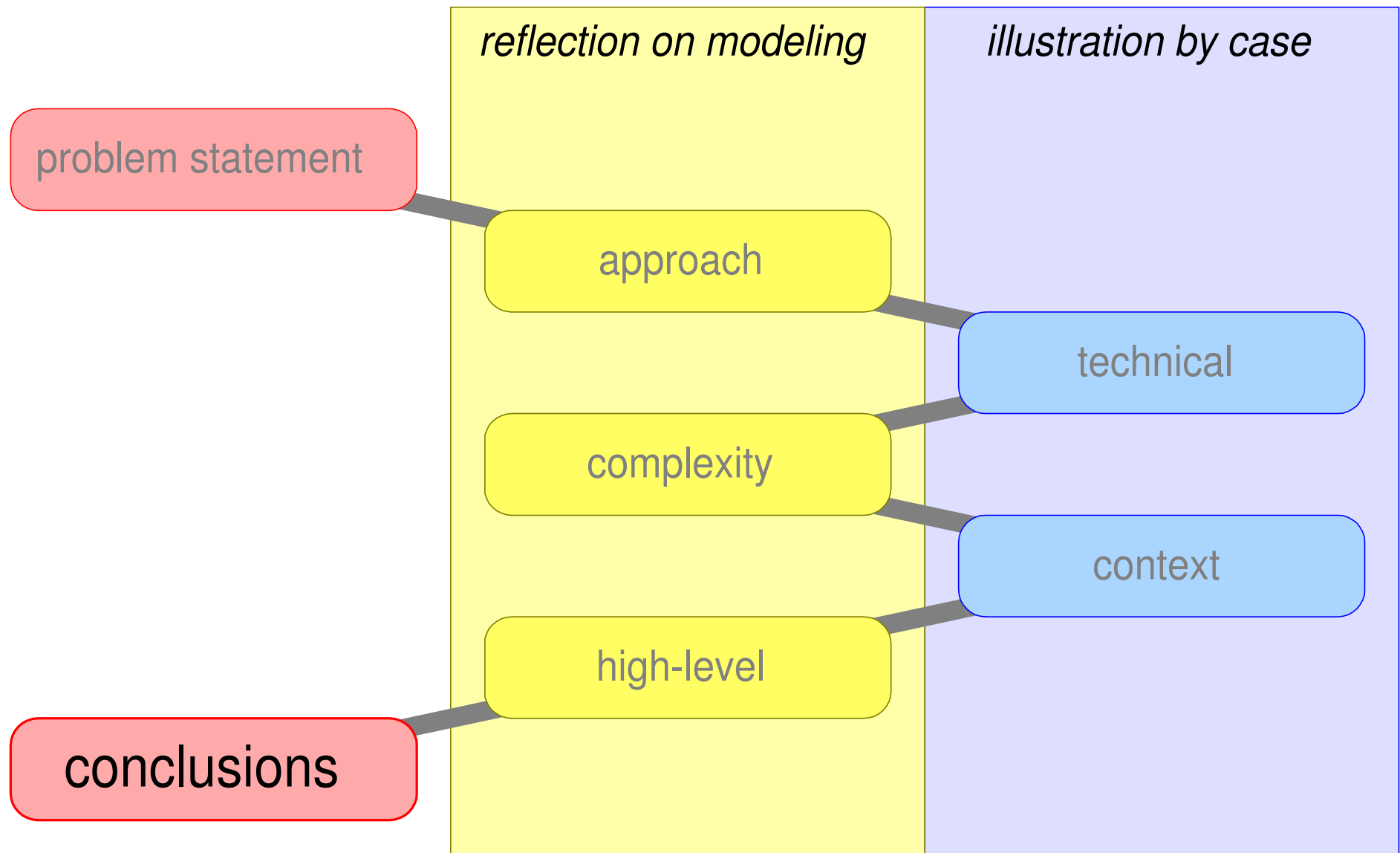


Model Life Cycle



Example Model Life Cycle





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