

# Modeling and Analysis: Life Cycle Models

by *Gerrit Muller* University of Southeast Norway-NISE

e-mail: [gaudisite@gmail.com](mailto:gaudisite@gmail.com)

[www.gaudisite.nl](http://www.gaudisite.nl)

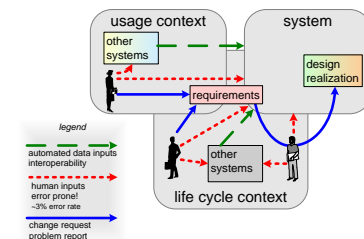
## Abstract

Products and enterprises evolve over time. This presentation explores the impact of these changes on the system and on the business by making (small and simple) models of life cycle aspects.

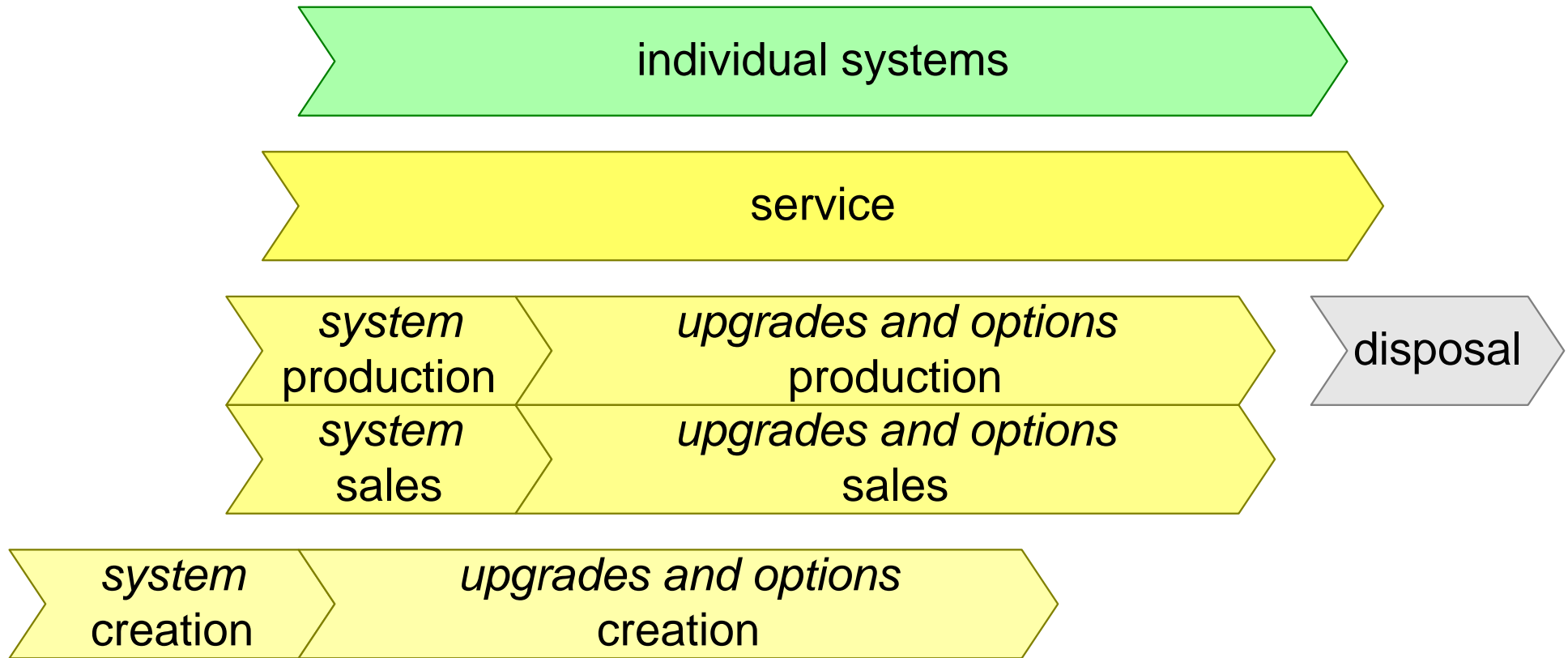
### Distribution

This article or presentation is written as part of the Gaudí project. The Gaudí project philosophy is to improve by obtaining frequent feedback. Frequent feedback is pursued by an open creation process. This document is published as intermediate or nearly mature version to get feedback. Further distribution is allowed as long as the document remains complete and unchanged.

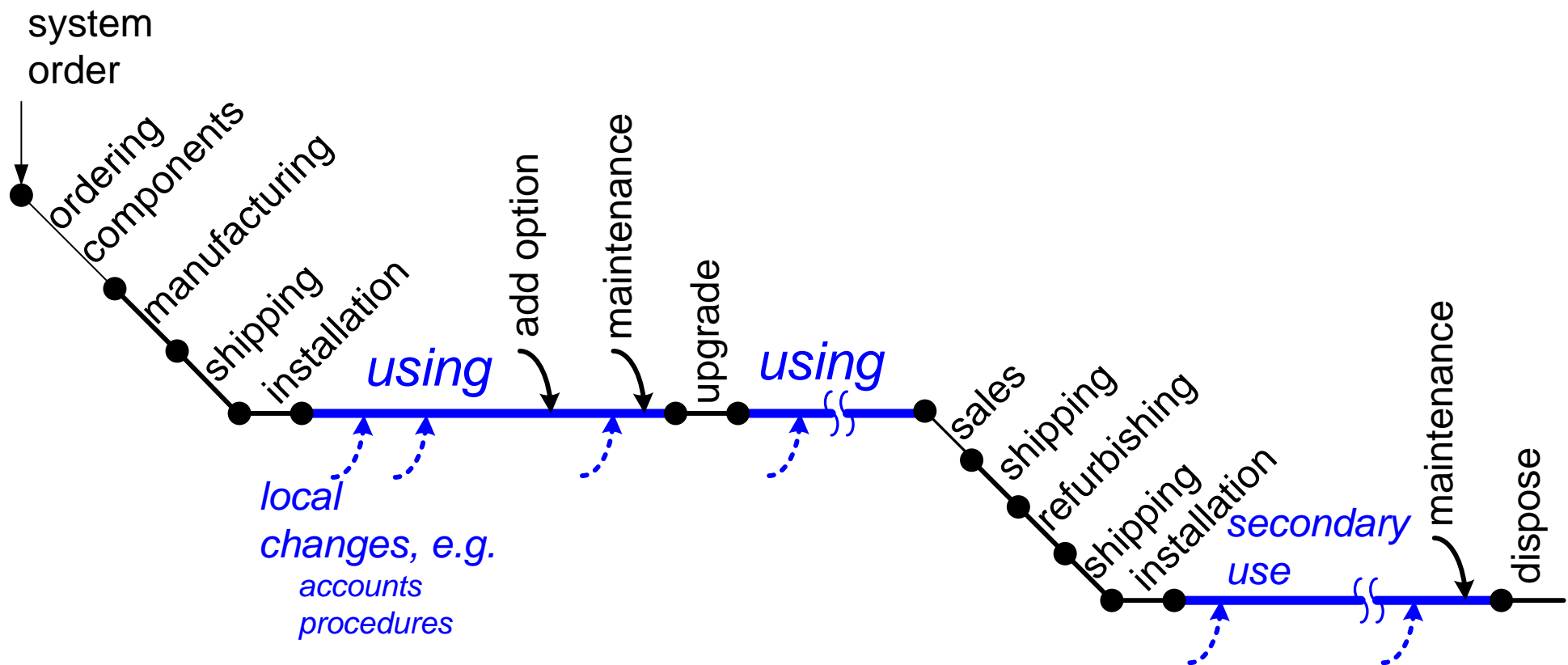
June 5, 2018  
status: preliminary  
draft  
version: 0.7



# Product Related Life Cycles



# System Life Cycle



# Approach to Life Cycle Modeling

Identify potential life cycle changes and sources	
Characterize time aspect of changes	how often how fast
Determine required effort	amount type
Determine impact of change on system and context	performance reliability
Analyse risks	business

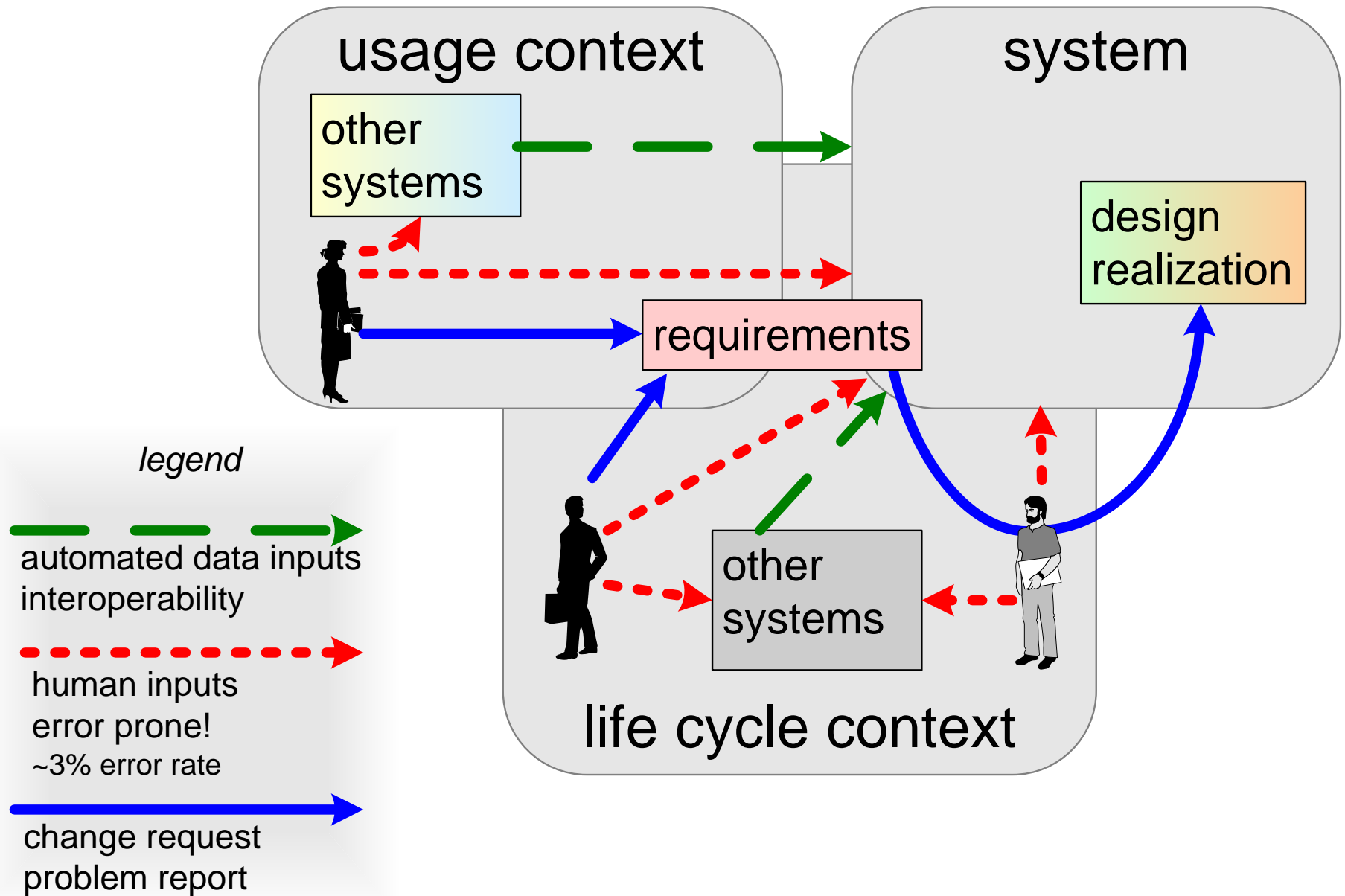
see reasoning

# What May Change During the Life Cycle?

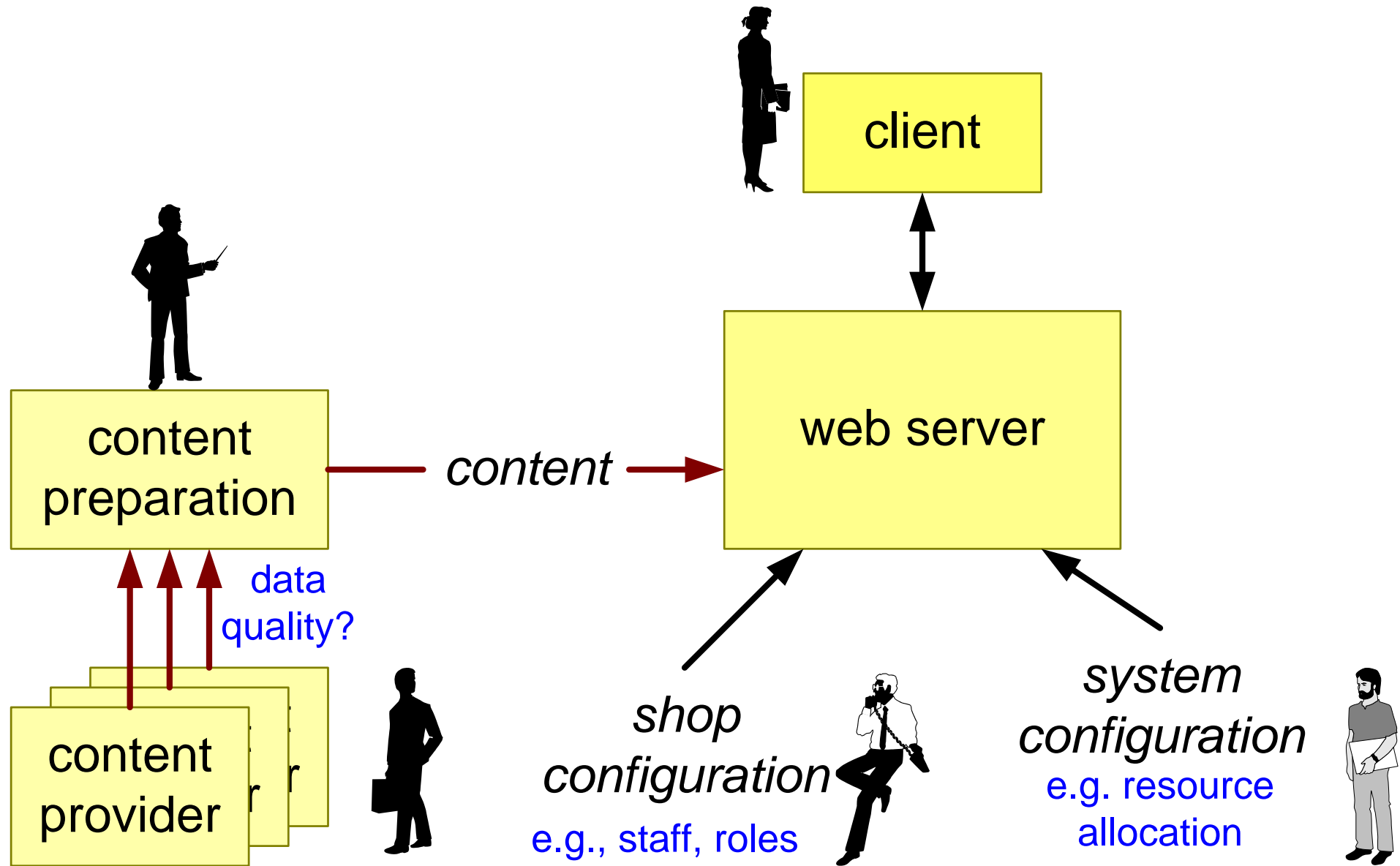
business volume  
product mix  
product portfolio  
product attributes (e.g. price)  
customers  
personnel  
suppliers  
application, business processes  
et cetera

[www.homes4sale.com](http://www.homes4sale.com)  
[www.apple.com/itunes/](http://www.apple.com/itunes/)  
[www.amazon.com](http://www.amazon.com)  
[www.ebay.com](http://www.ebay.com)  
[www.shell.com](http://www.shell.com)  
[www.stevens.edu](http://www.stevens.edu)  
[www.nokia.com](http://www.nokia.com)  
stock market  
insurance company  
local Dutch cheese shop

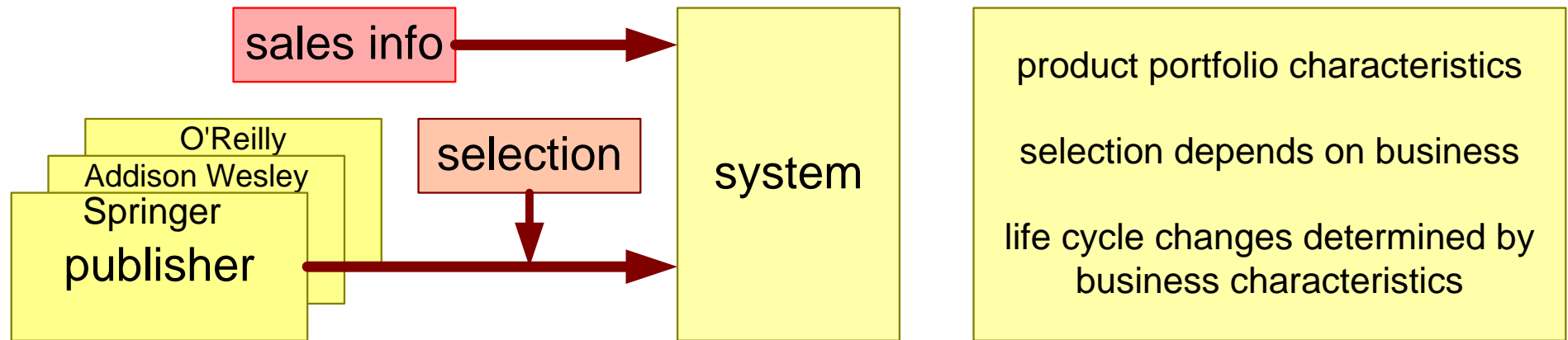
# Simple Model of Data Sources of Changes



# Data Sources of Web Server



# Example Product Portfolio Change Books

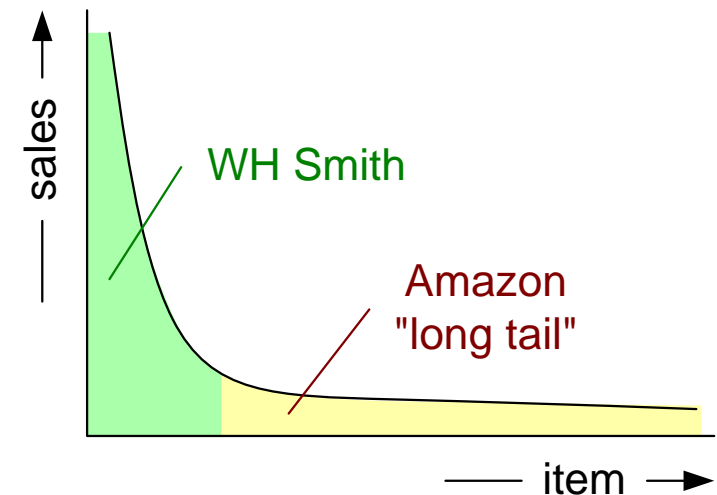


## new books per year

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](http://en.wikipedia.org/wiki/Books_published_per_country_per_year)

source: [http://en.wikipedia.org/wiki/Long\\_tail](http://en.wikipedia.org/wiki/Long_tail)





# Example Customer Change

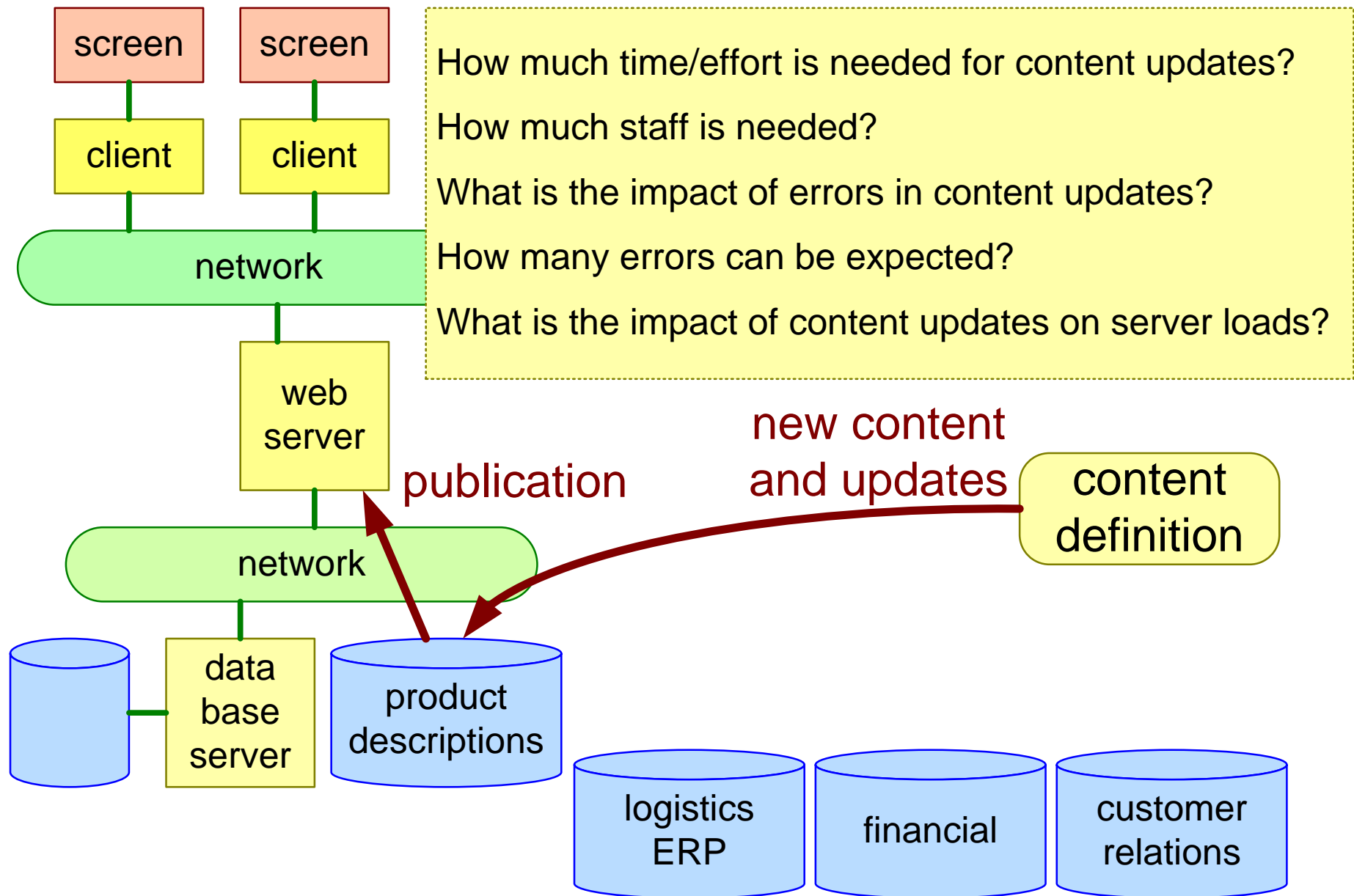
## *internet: broadband penetration*

	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%

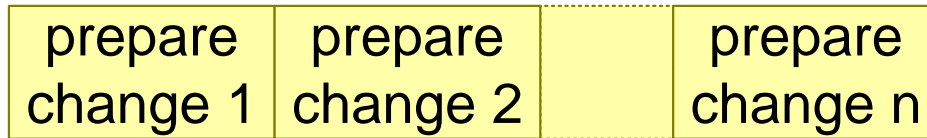
[http://www.apira.org/download/world\\_broadband\\_statistics\\_q2\\_2004.pdf](http://www.apira.org/download/world_broadband_statistics_q2_2004.pdf)

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?

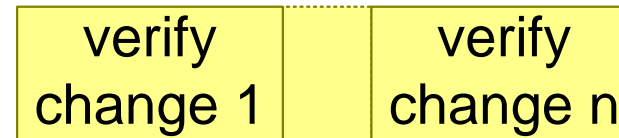
# Web Shop Content Update



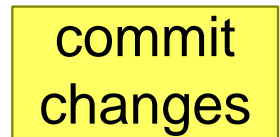
# Web Shop Content Change Effort



review input  
select info  
layout&cosmetics  
check-in



inspect source  
inspect result



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

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

$n_{\text{changes}}$ 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

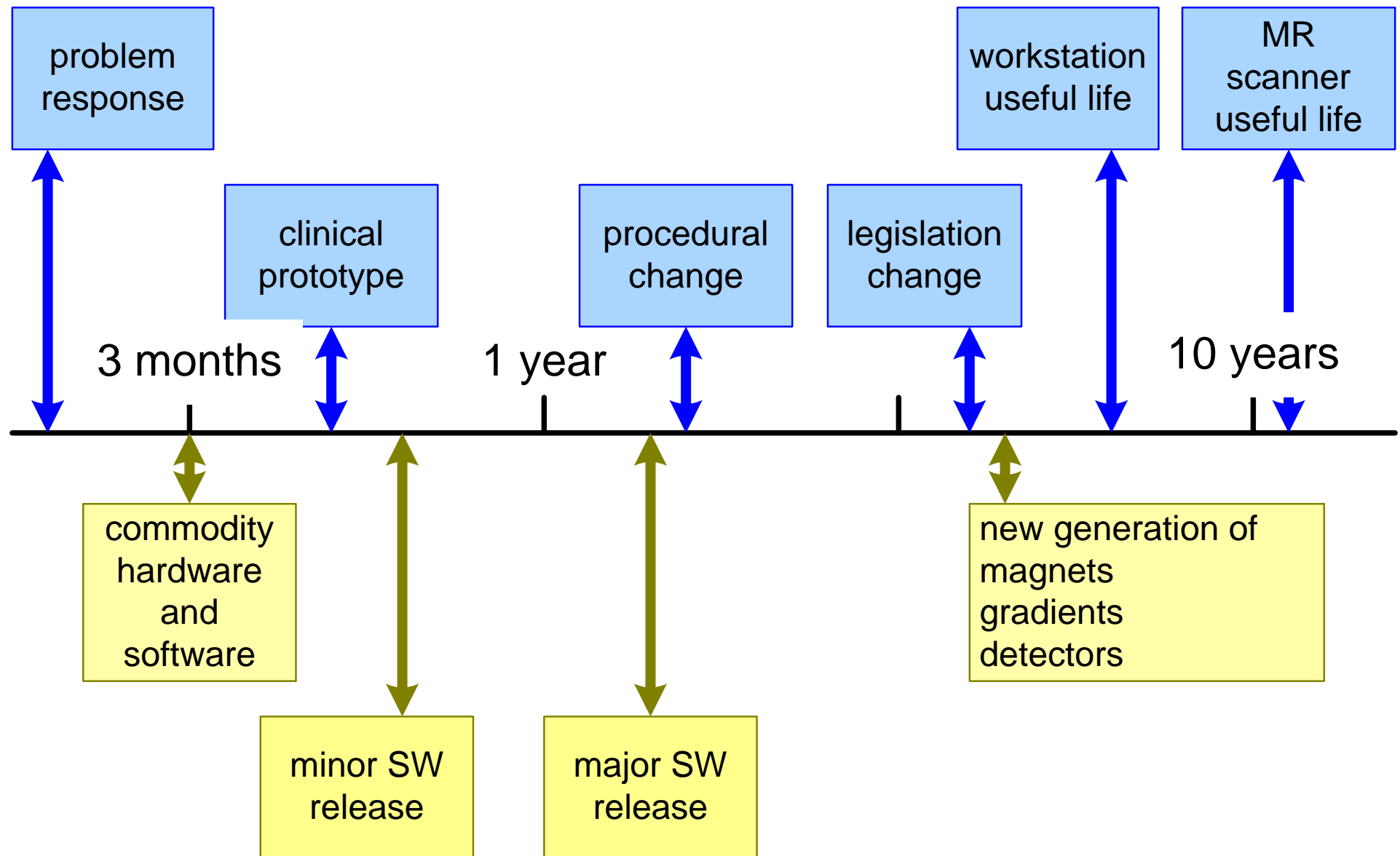
# Example of Client Level Changes

The image shows a screenshot of the Amazon.com website with several yellow callout boxes and arrows pointing to specific features:

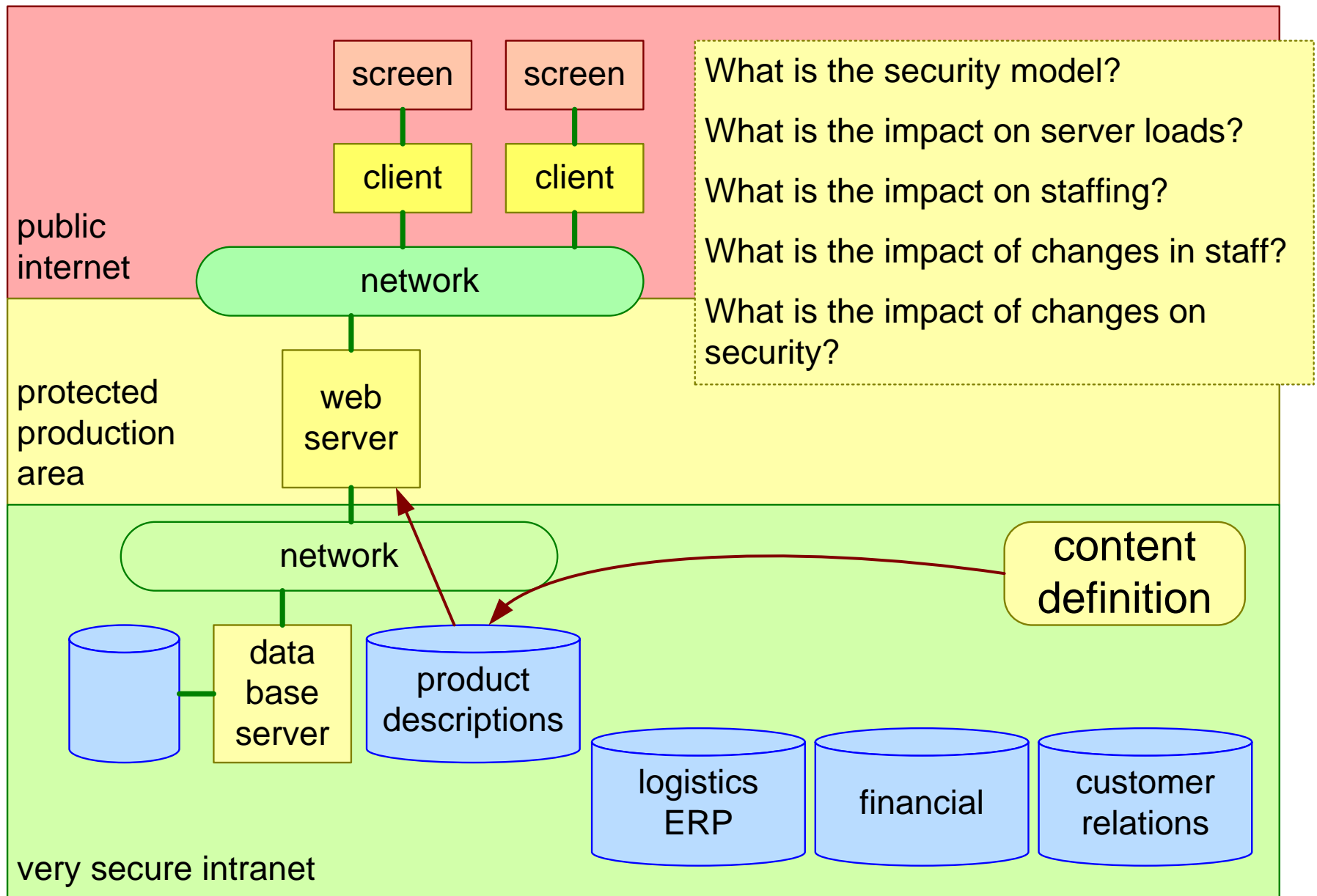
- main access through search**: Points to the search bar at the top of the page.
- personalization**: Points to the text "Hello. Sign in to get personalized recommendations. New customer? Start here." below the search bar.
- catalogue entries**: A vertical box on the left side pointing to the "Browse" menu.
- styling: frequently updated, fashion!**: A box on the right side pointing to the promotional banners and advertisements.
- other advertisements**: A vertical box on the right side pointing to the "Extreme Savings on" and "Free Stand with Bow" ads.
- Up-to-date information: Bestsellers What Other Customers Are Looking At Right Now**: A large box in the center pointing to the "Books Bestsellers" and "What Other Customers Are Looking At Right Now" sections.
- standard boilerplate**: A box at the bottom pointing to the footer navigation links.

snapshot of  
www.amazon.com

# Example of Time Scale Model for Changes



# 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