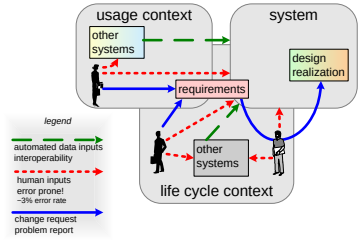
Modeling and Analysis: Life Cycle Models

by *Gerrit Muller* University of South-Eastern Norway-NISE
e-mail: gaudisite@gmail.com
www.gaudisite.nl

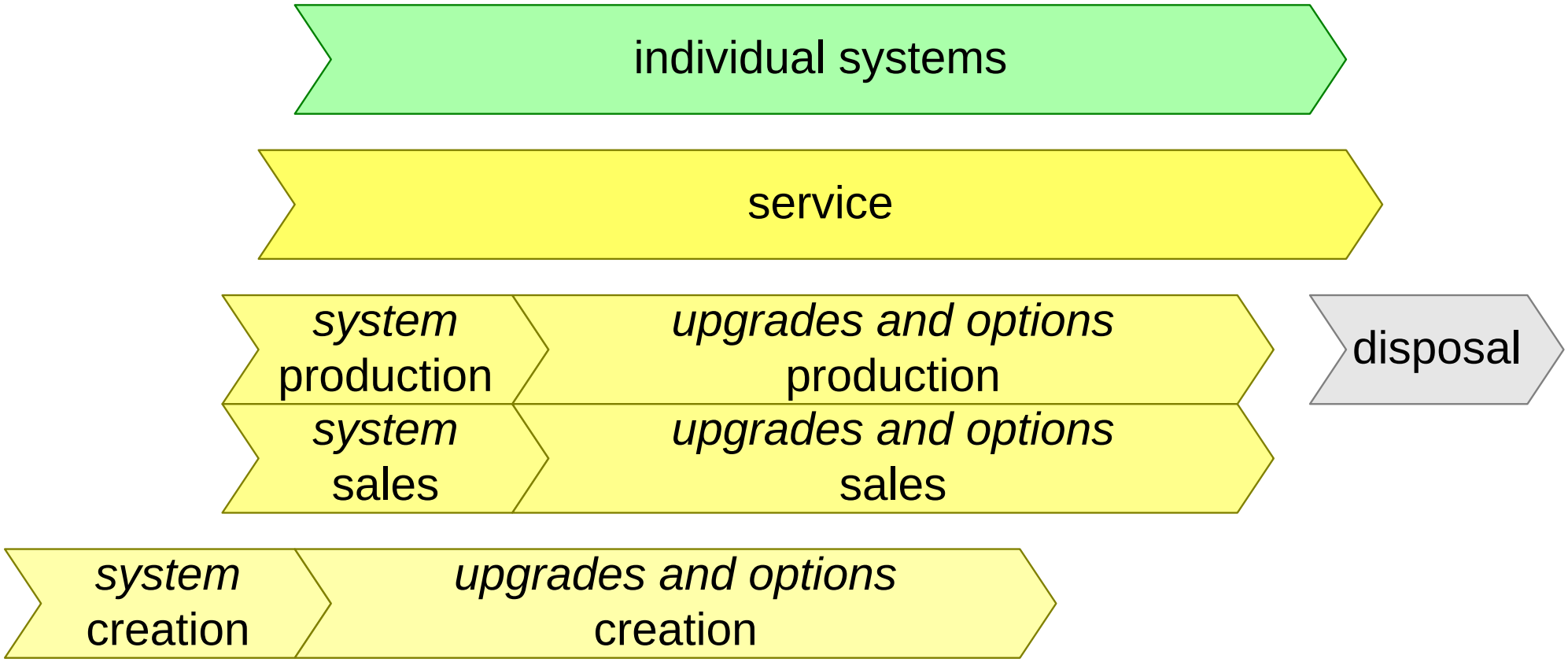
Abstract

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.

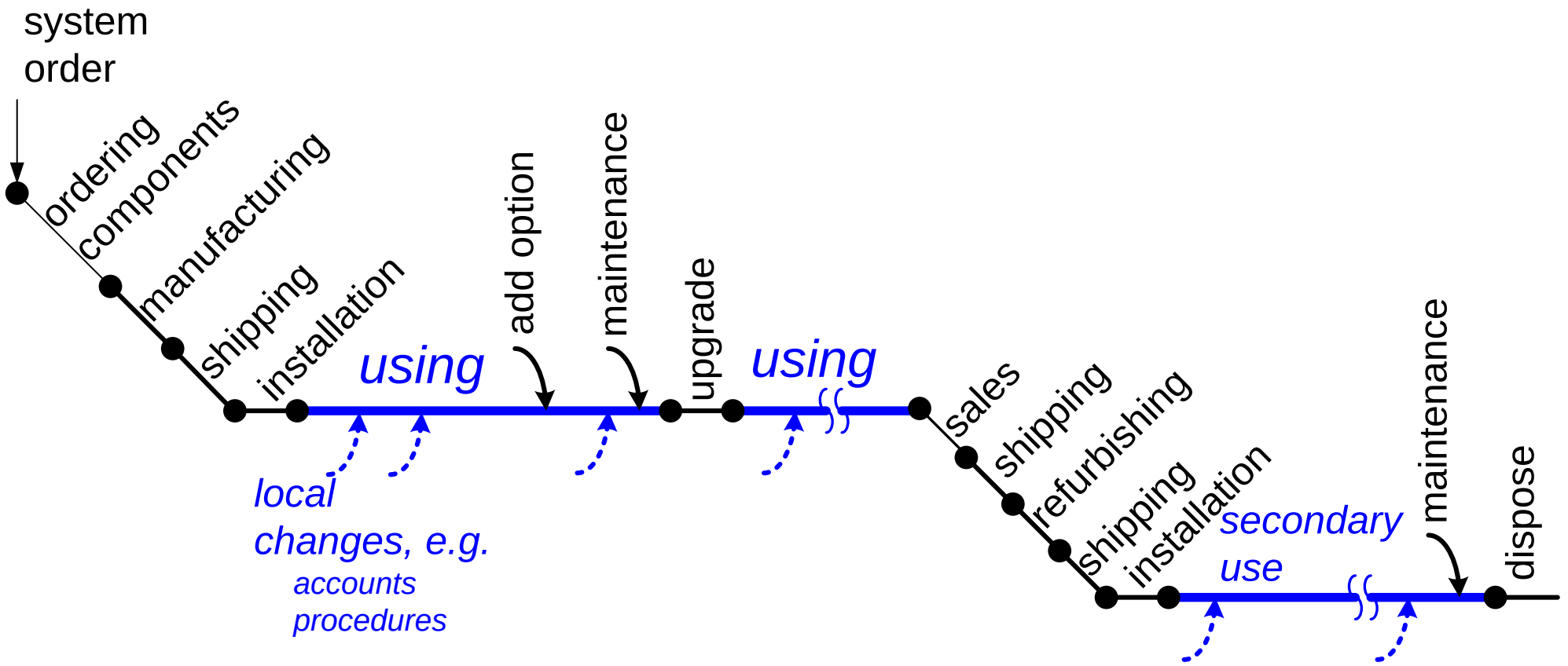
August 21, 2020
status: preliminary draft
version: 0.7



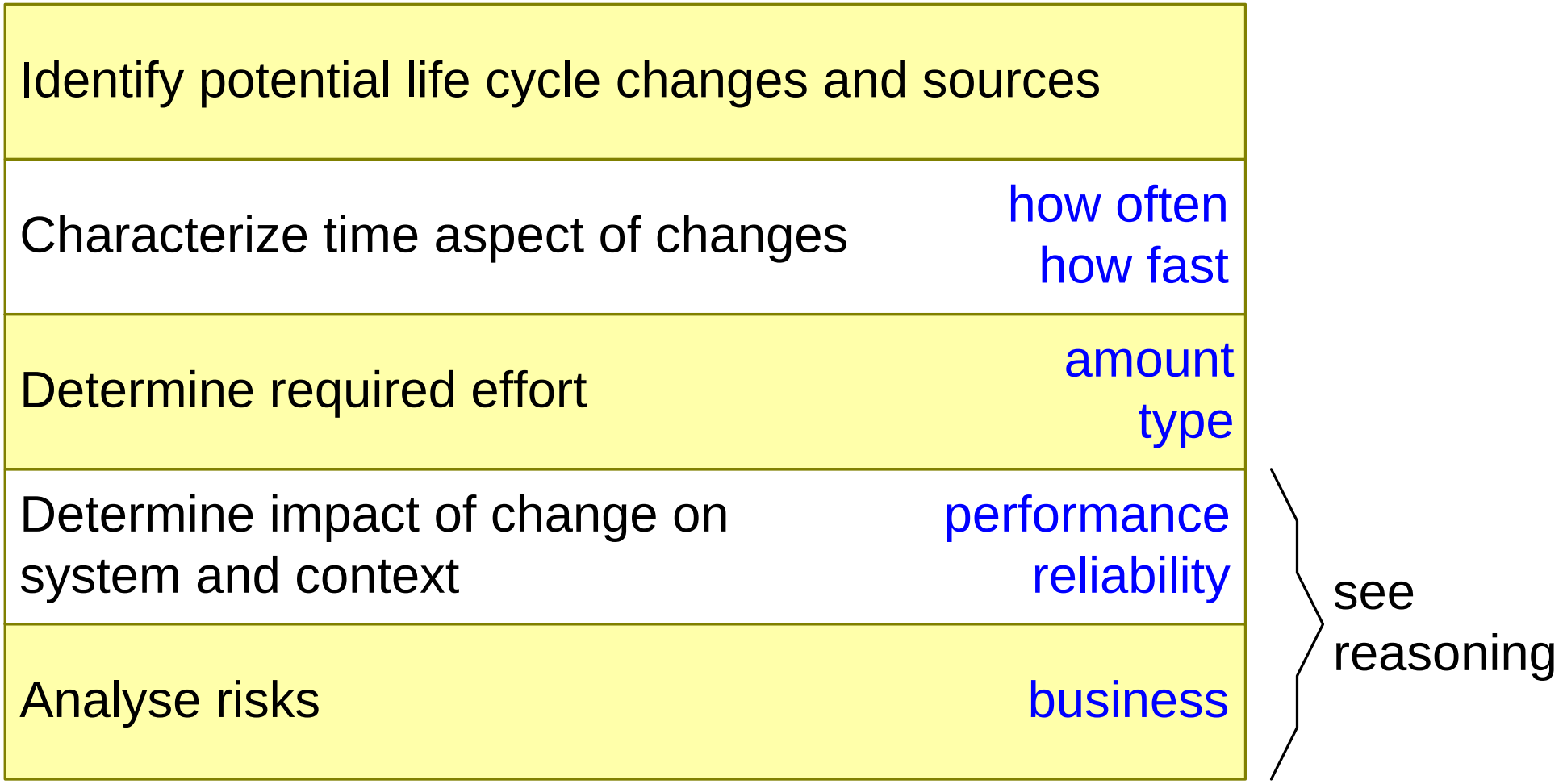
Product Related Life Cycles



System Life Cycle



Approach to Life Cycle Modeling



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

www.apple.com/itunes/

www.amazon.com

www.ebay.com

www.shell.com

www.stevens.edu

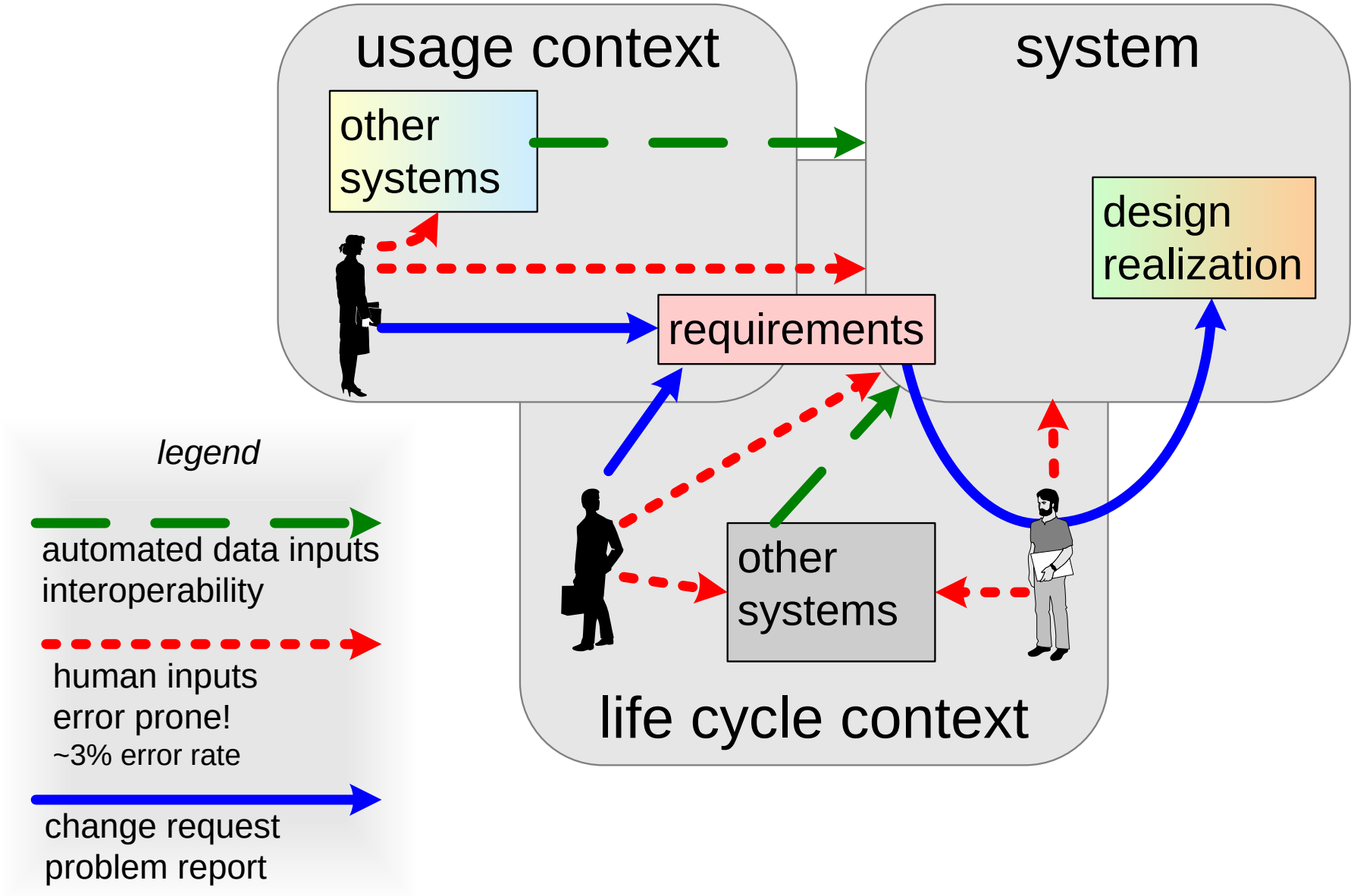
www.nokia.com

stock market

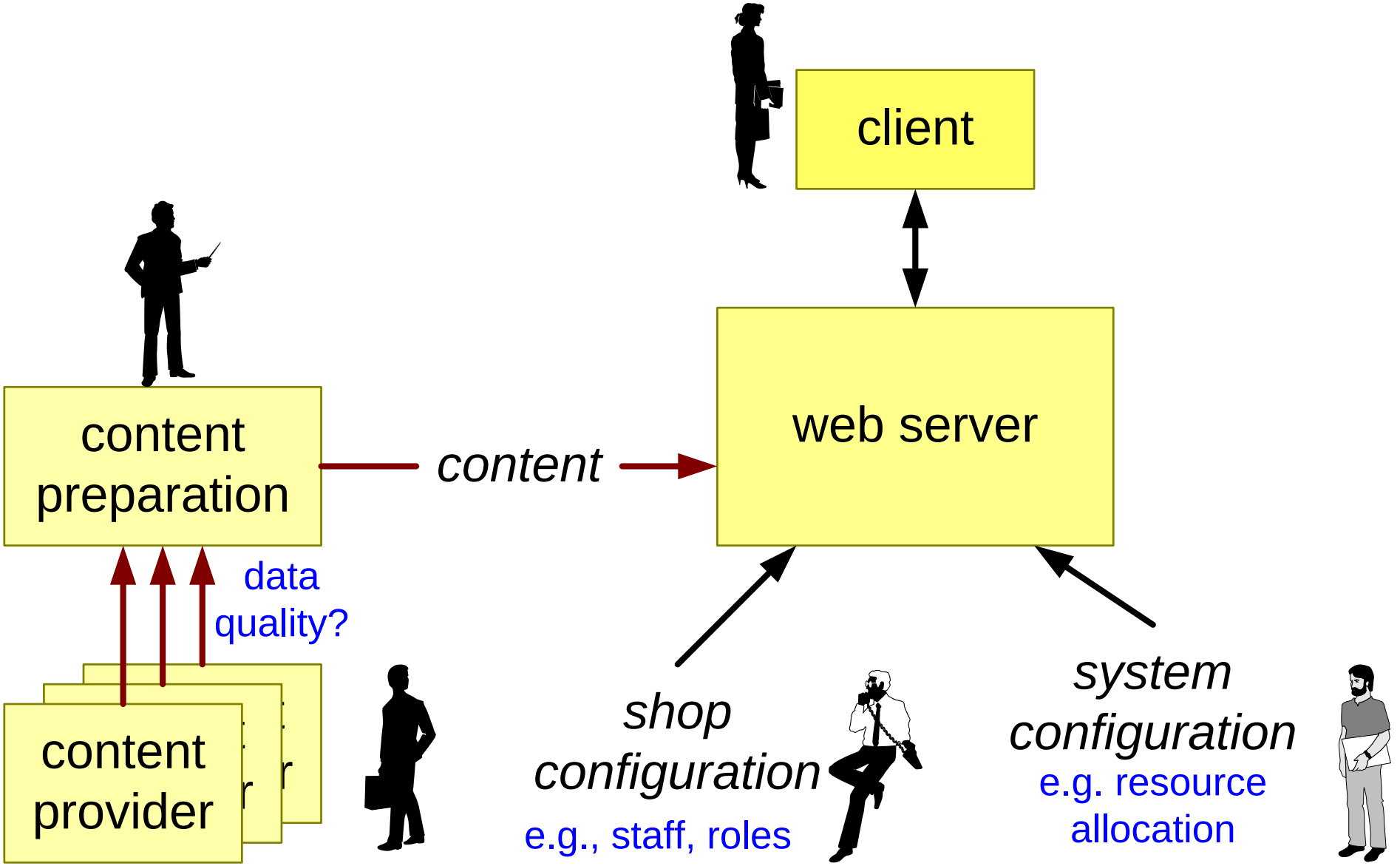
insurance company

local Dutch cheese shop

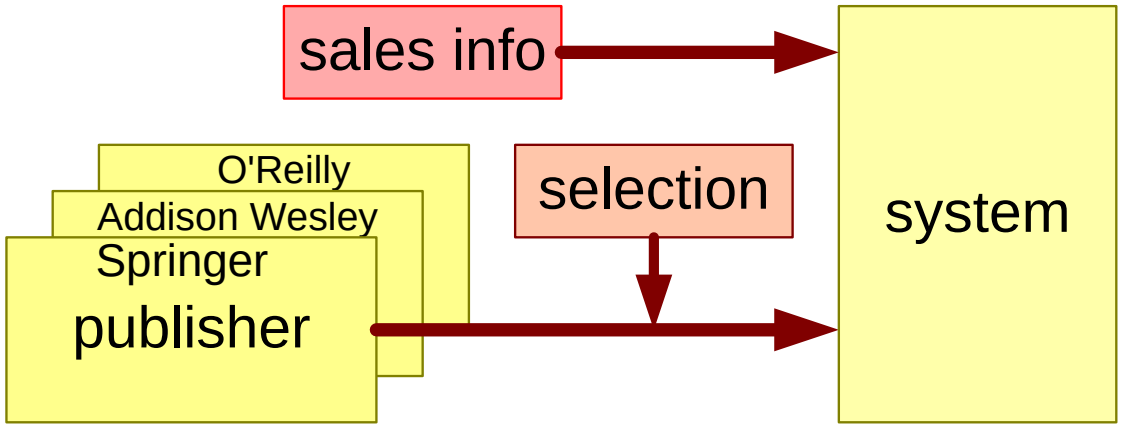
Simple Model of Data Sources of Changes



Data Sources of Web Server



Example Product Portfolio Change Books



product portfolio characteristics

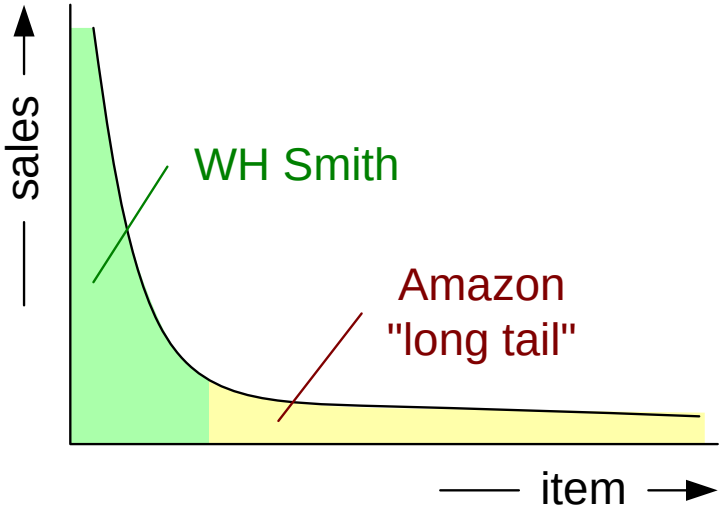
selection depends on business

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

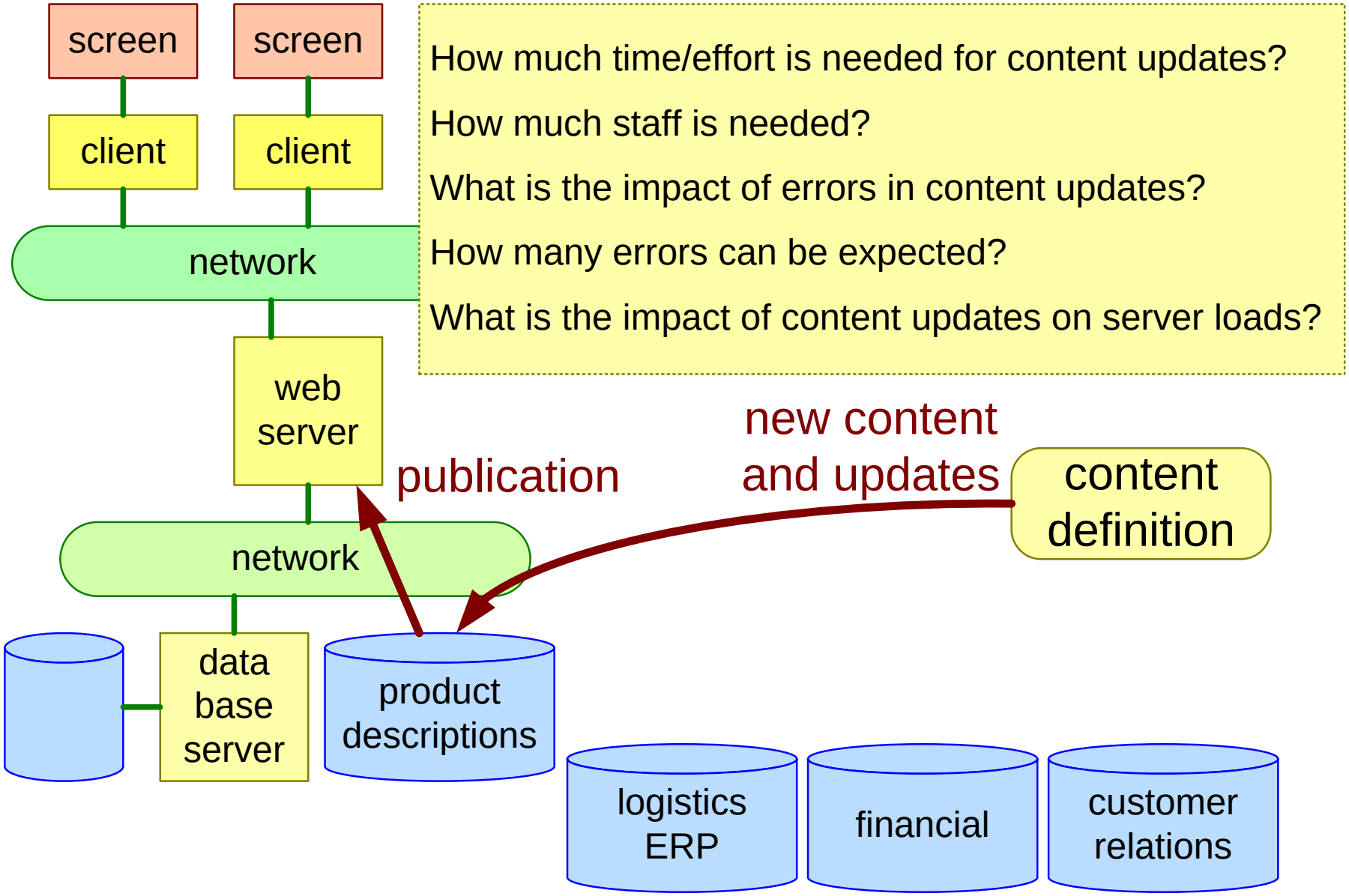
What is the expected growth of # customers?

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

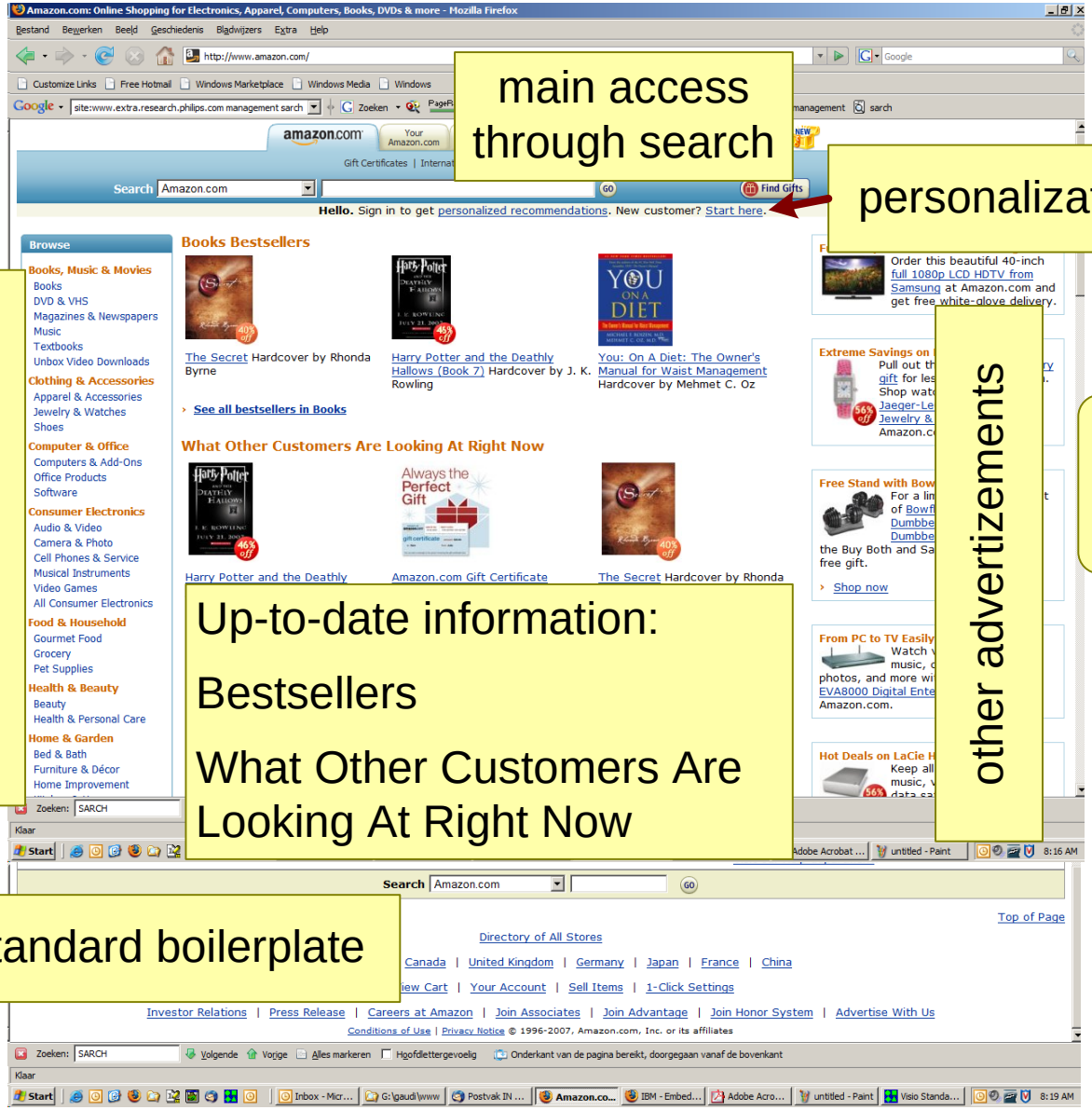
with $t_{prepare}$ = 4 min

t_{verify} = 2 min

t_{commit} = 1 min

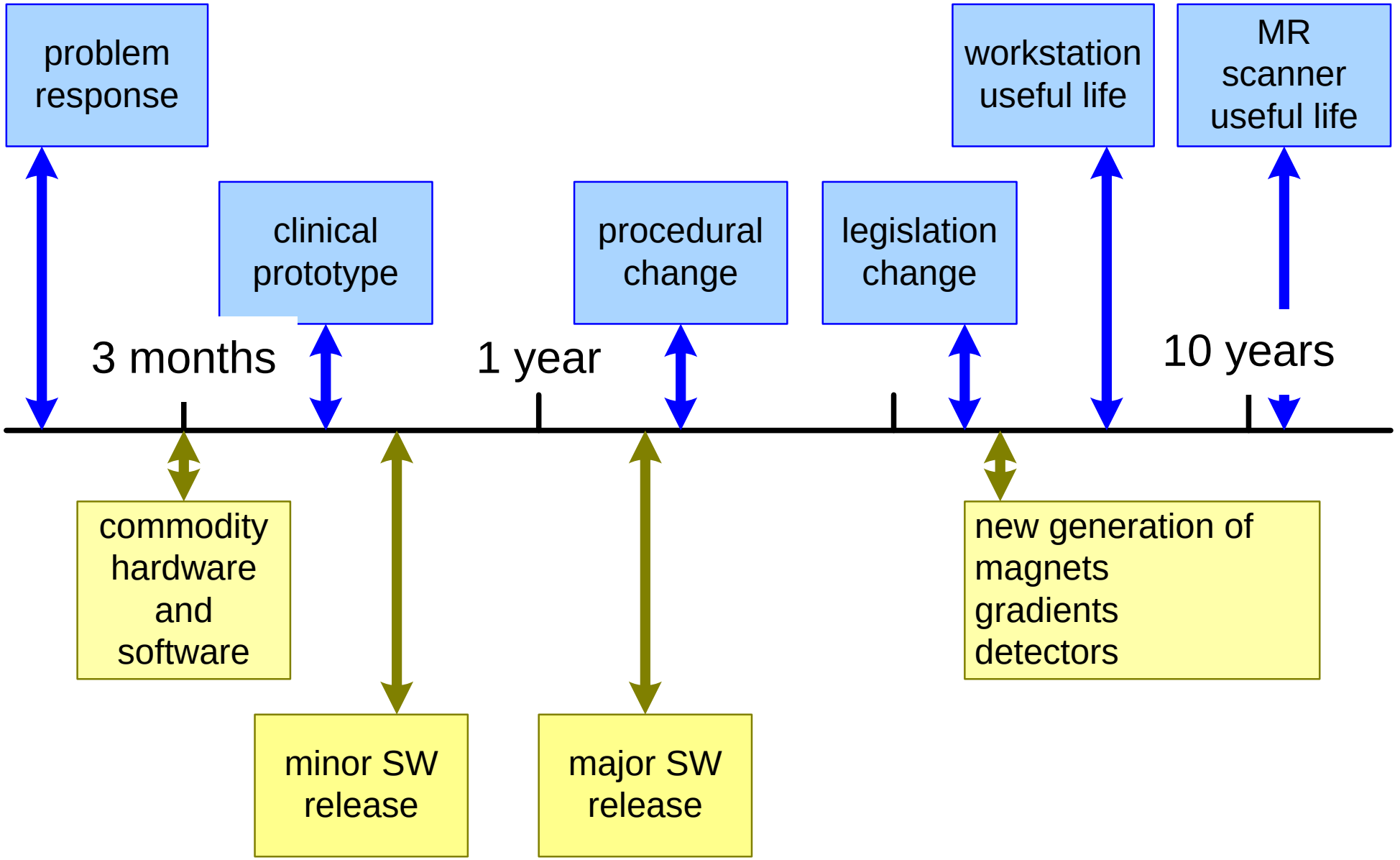
hours per day = 8 hours

Example of Client Level Changes

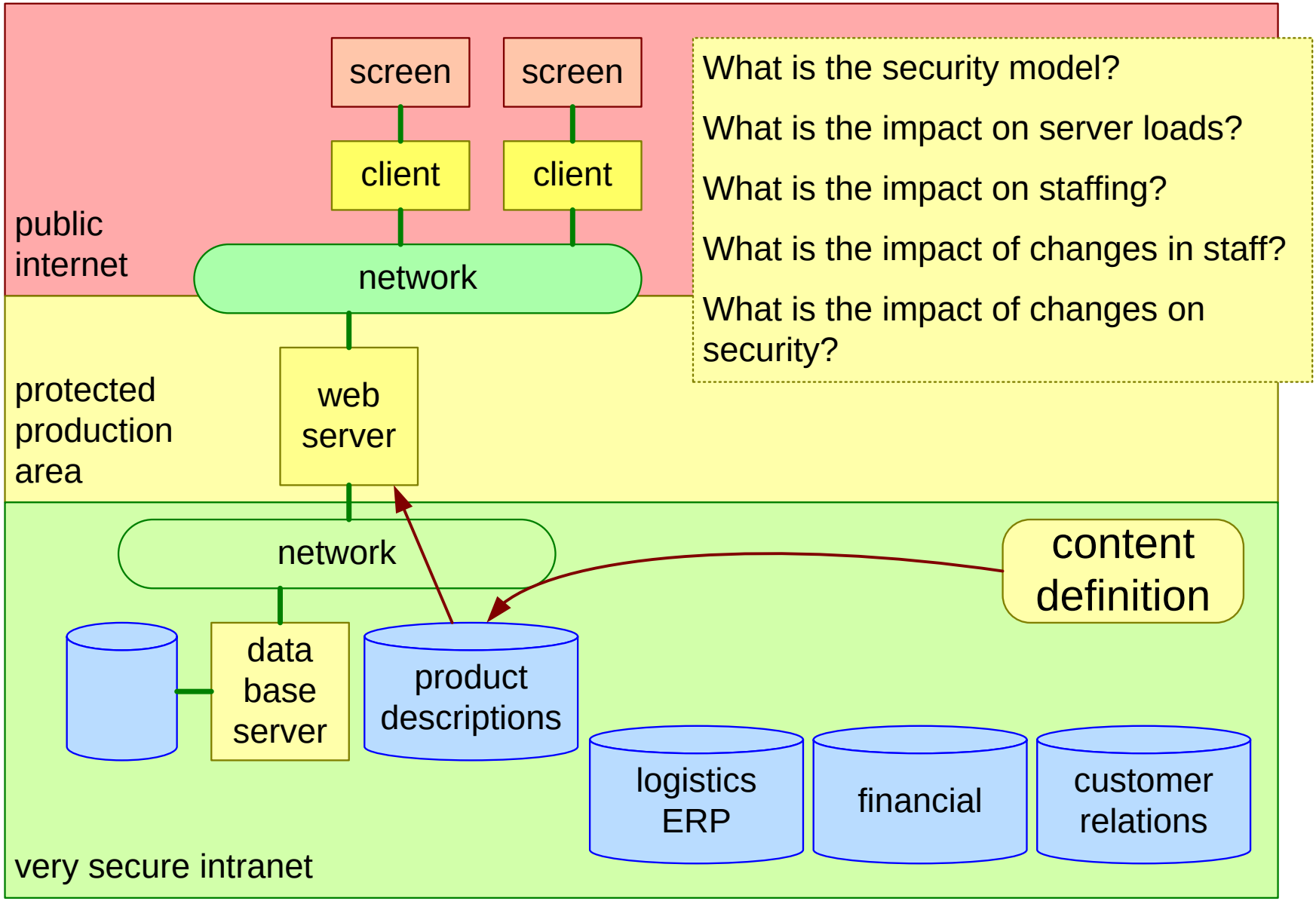


snapshot of www.amazon.com

Example of Time Scale Model for Changes



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