

Architecting User Value:

From technical Engineering to Value Engineering

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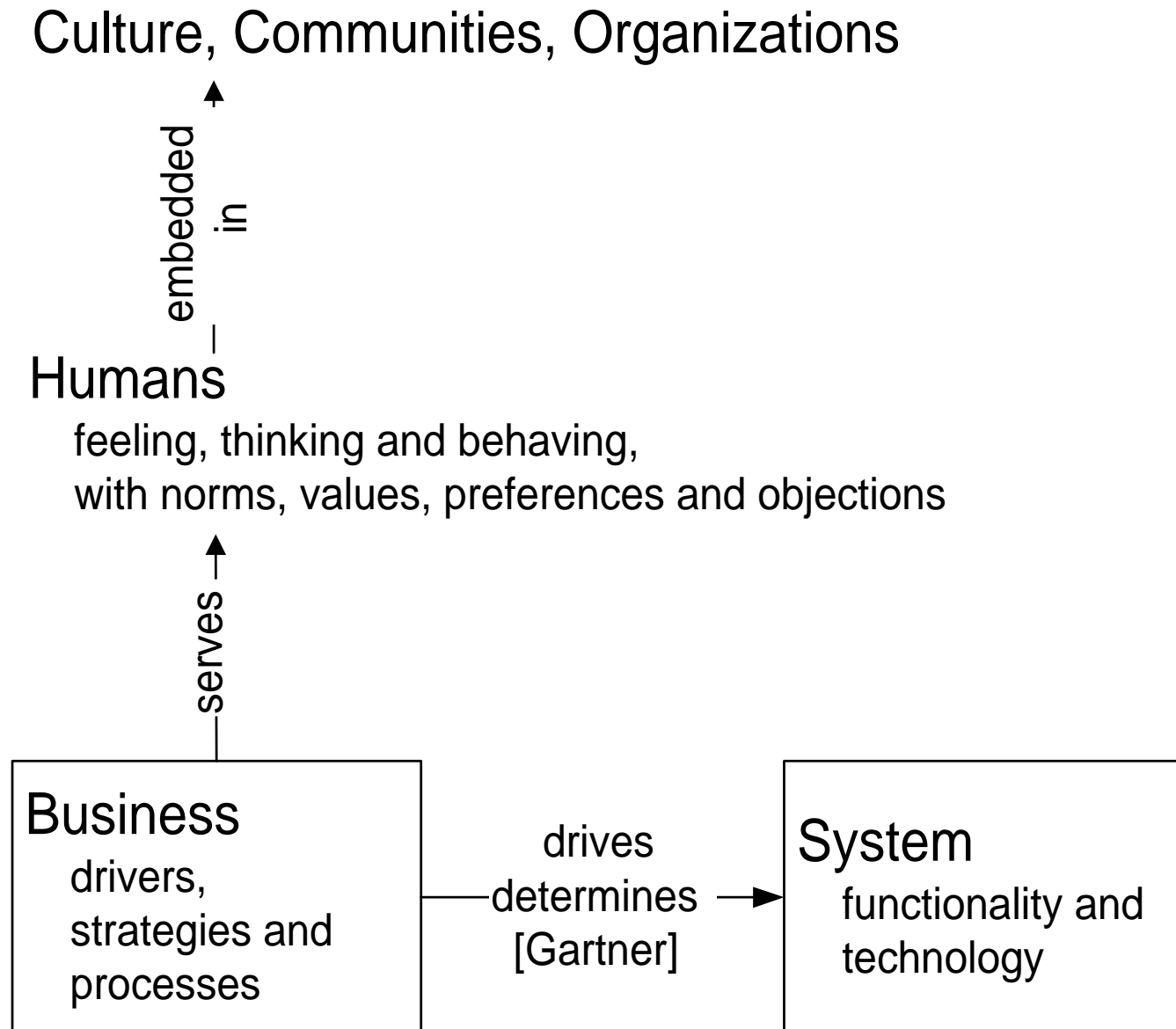
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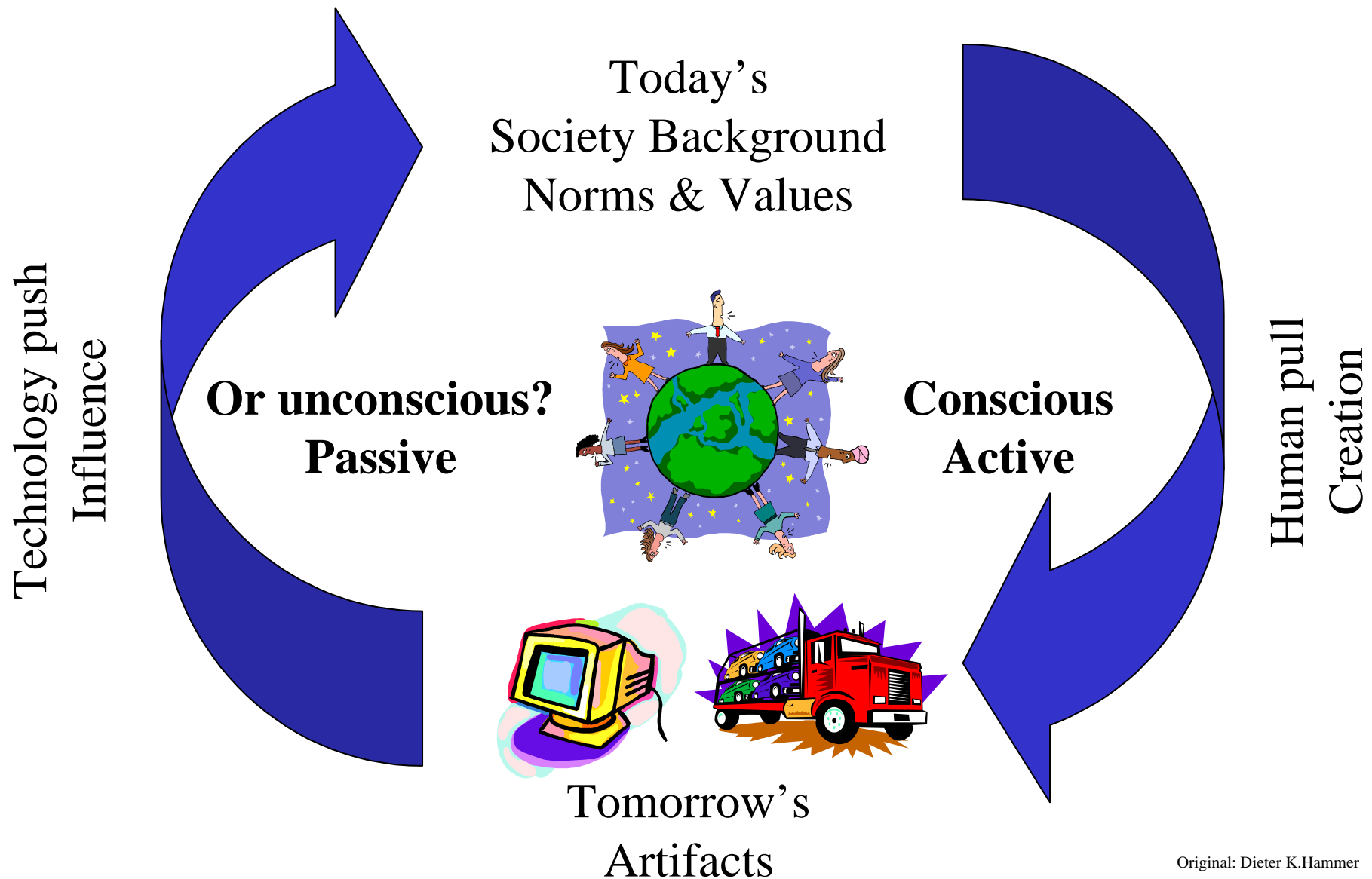
Abstract

Today's IT development is extremely driven by technology instead of the needs of humans and organizations. We consider this to be a highly undesirable and even dangerous situation. Inspired by an analysis of the driving forces and the adverse effects of this situation, we propose an alternative way of thinking that could have the potential to change the current trend. In this approach, the system architect fulfills a crucial role by considering the needs of all stakeholders and integrating the aspects of the human/organizational, process and technology aspects of the total system. In our view, this integration must not only consider the business drivers, but also general human and organization values like human behavior and organization culture. This requires, however, system architects that have also insight in the non-technical parts of the game, in order to make product development more demand-driven and human-oriented.

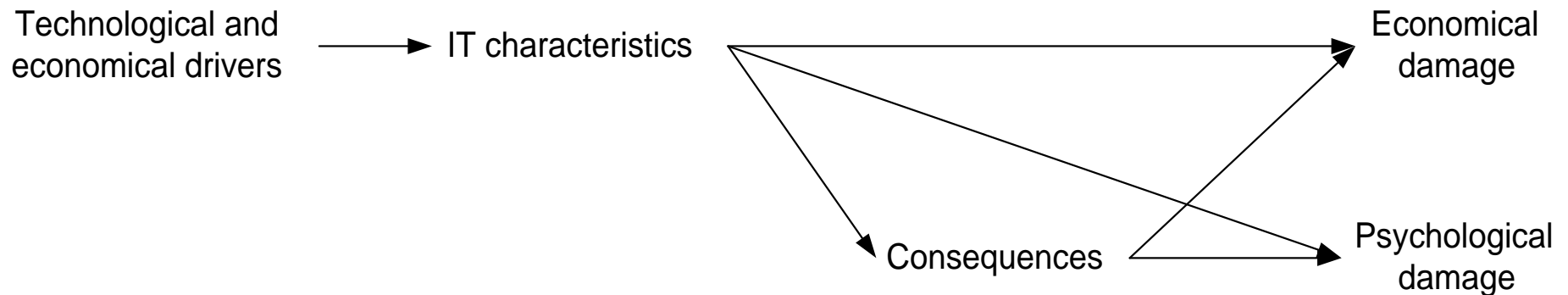
Technology serves humans, not vice versa



The Janus face of technology



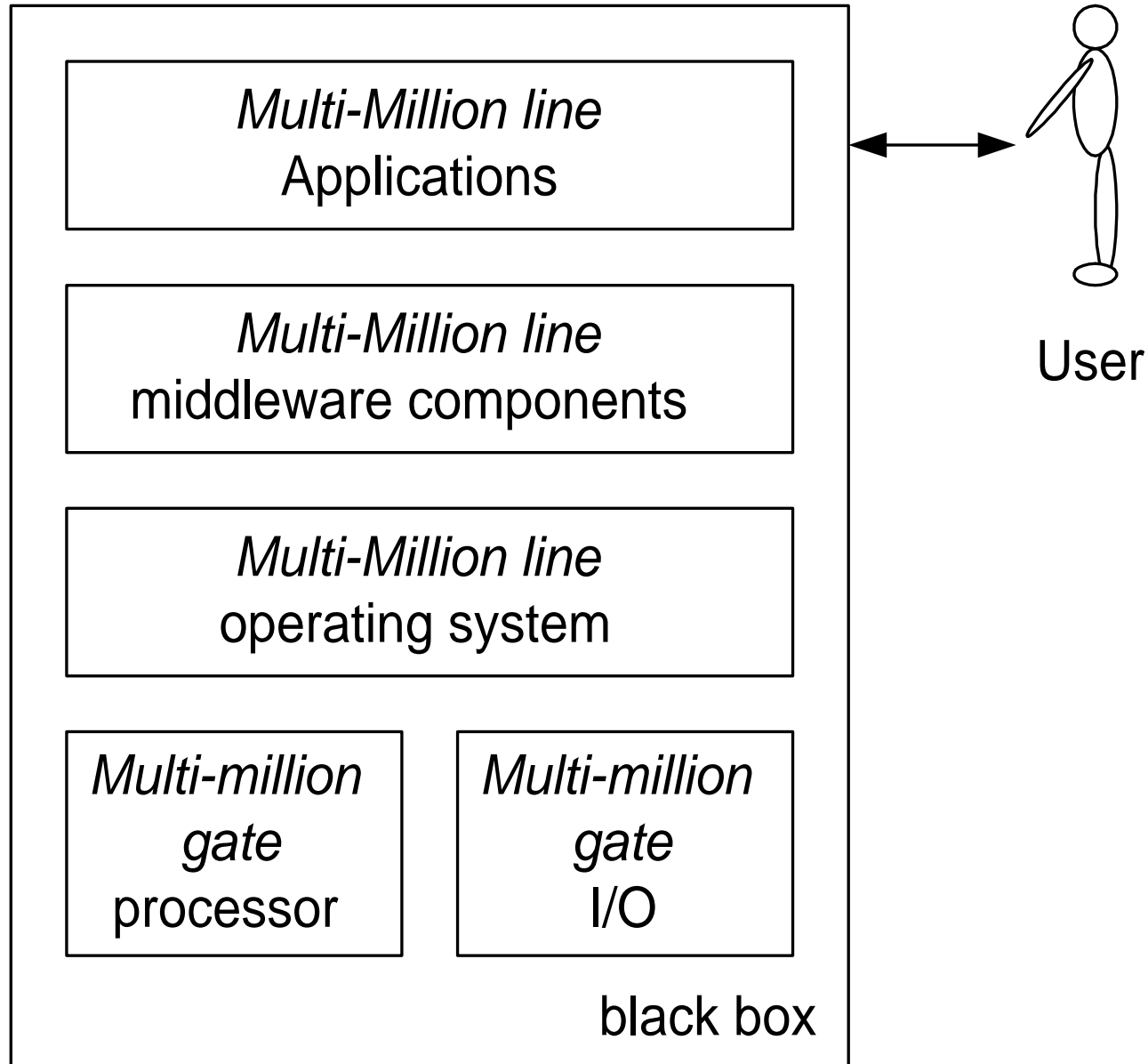
Cause Analysis of today's IT problems



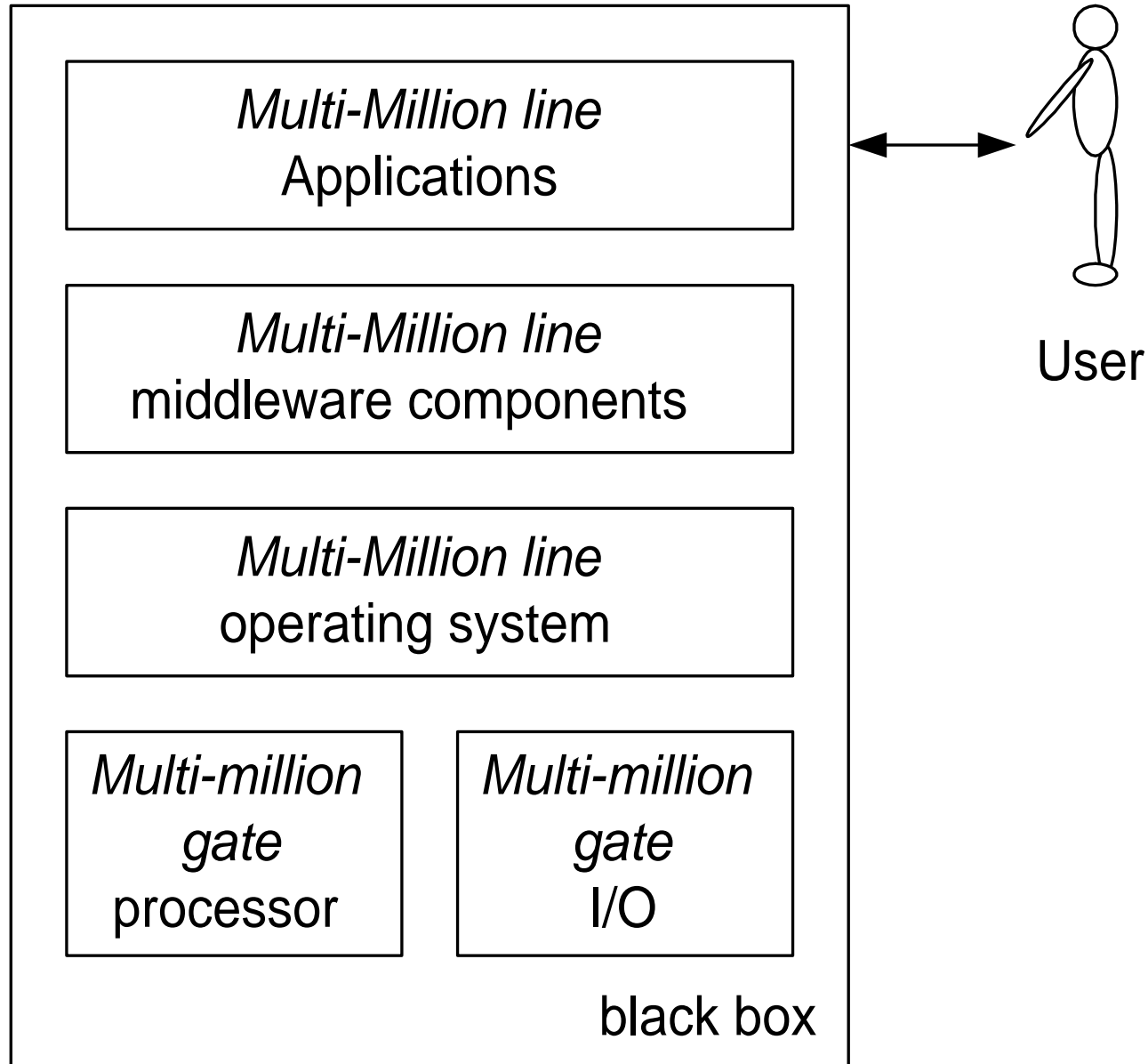
IT characteristics

- Complexity
- Free Production
- Virtuality and Reality becomes indistinguishable
- Computers decisions are anonymous
- IT solutions are created by "Enginerds"

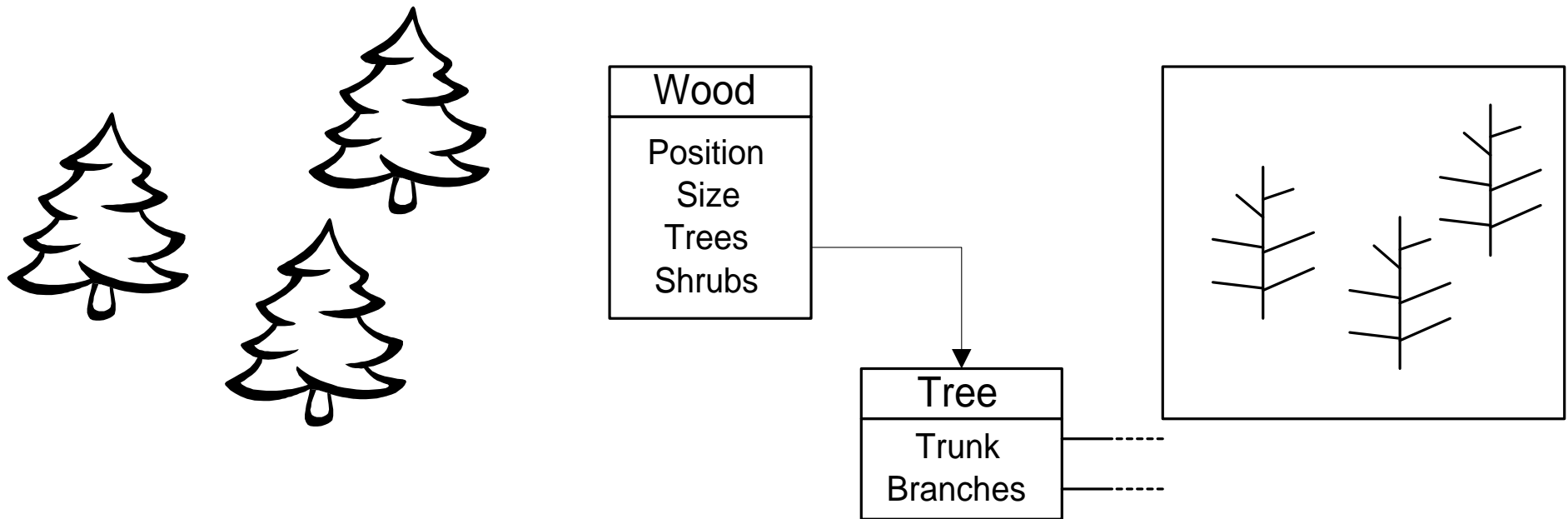
Complexity



Free production



Virtuality or reality?



Consequences

- Malfunctioning software
- Abundant software of dubious quality
- Inbalance and instability of the total system
- Unforeseen side effects
- Ethical and legislative blurring
- Forcing of users

Malfunctioning software

Multi-Million line
Applications

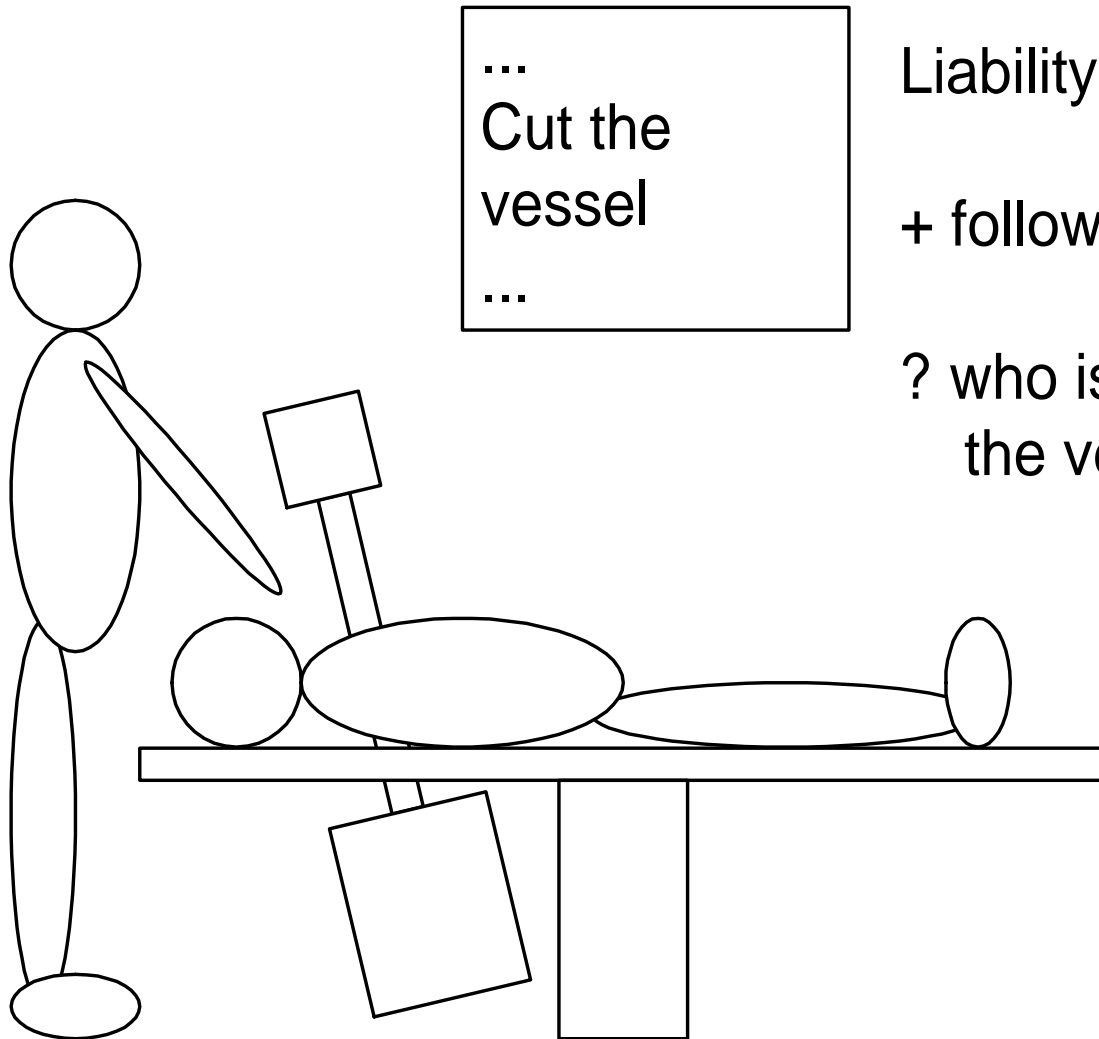
Multi-Million line
middleware components

Multi-Million line
operating system

Unit used in Error Metrics:

Number of errors
per **kilo** lines of code

Ethical and legislative blurring



Liability:

+ follow the mandatory procedure

? who is responsible when cutting
the vessel kills the patient?

Economical damage

- Pay for unused functions
- Security failures
- High project failure rate
- Support dependence
- Fuzzing

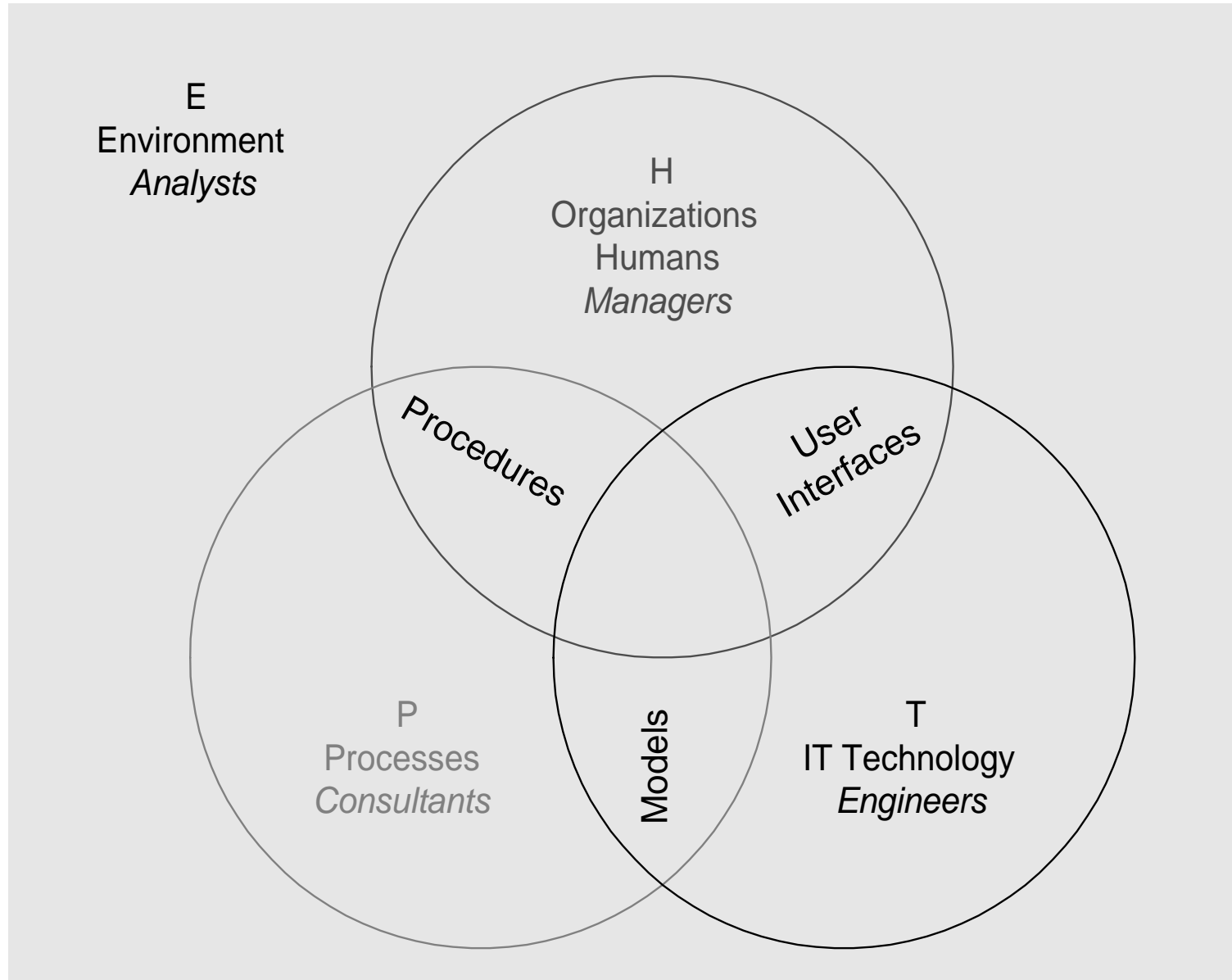
Denver Airport: Luggage handling

- The system was not ready when the new airport was finished -> opening was delayed for many months.
- Operational the system goofed many times, disturbing airport operation

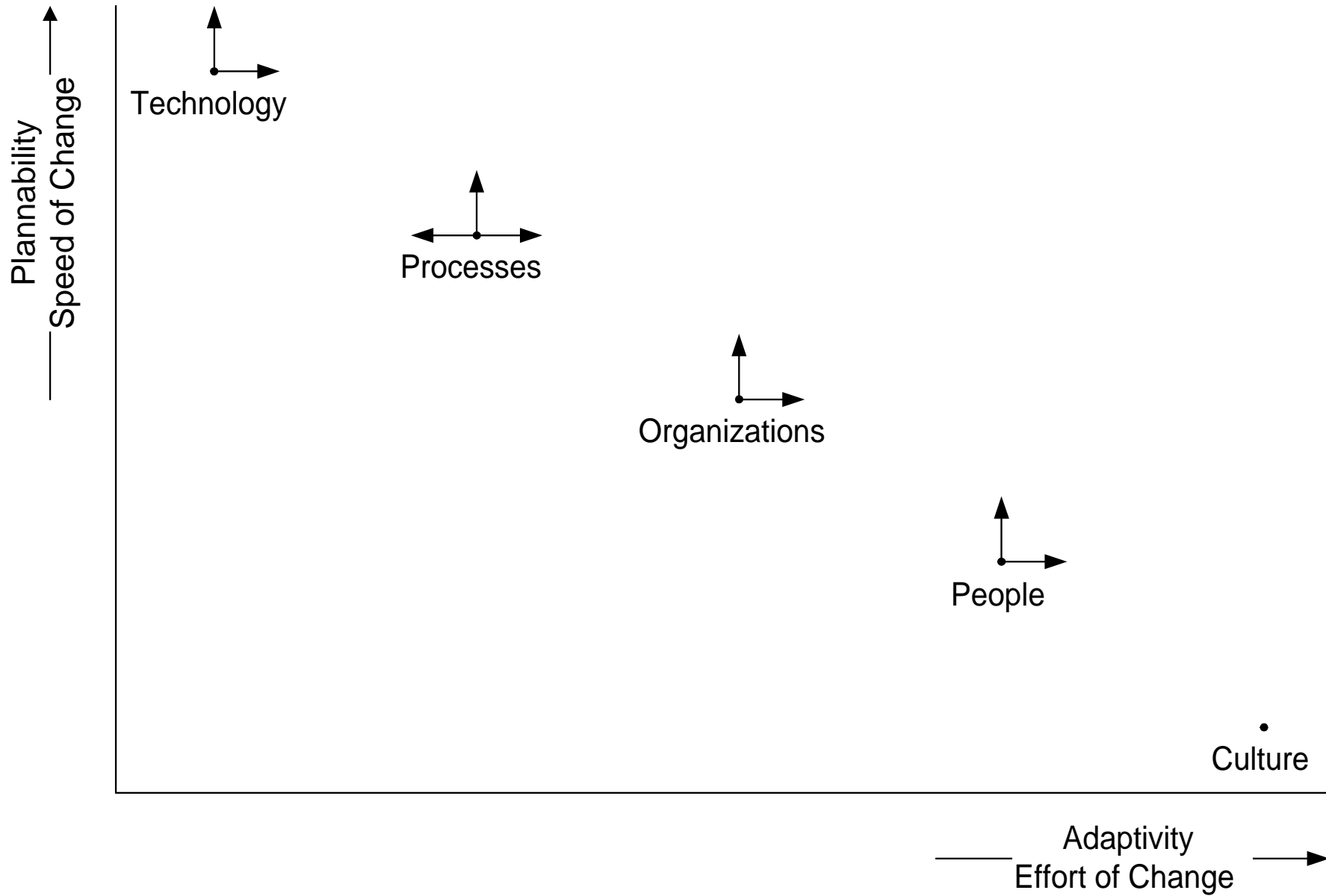
Psycho-social damage

- Playing with IT as an alibi for primary activities
- New forms of criminality
- Laziness and superficiality
- Fading ethics
- Restricted and abstract human interaction

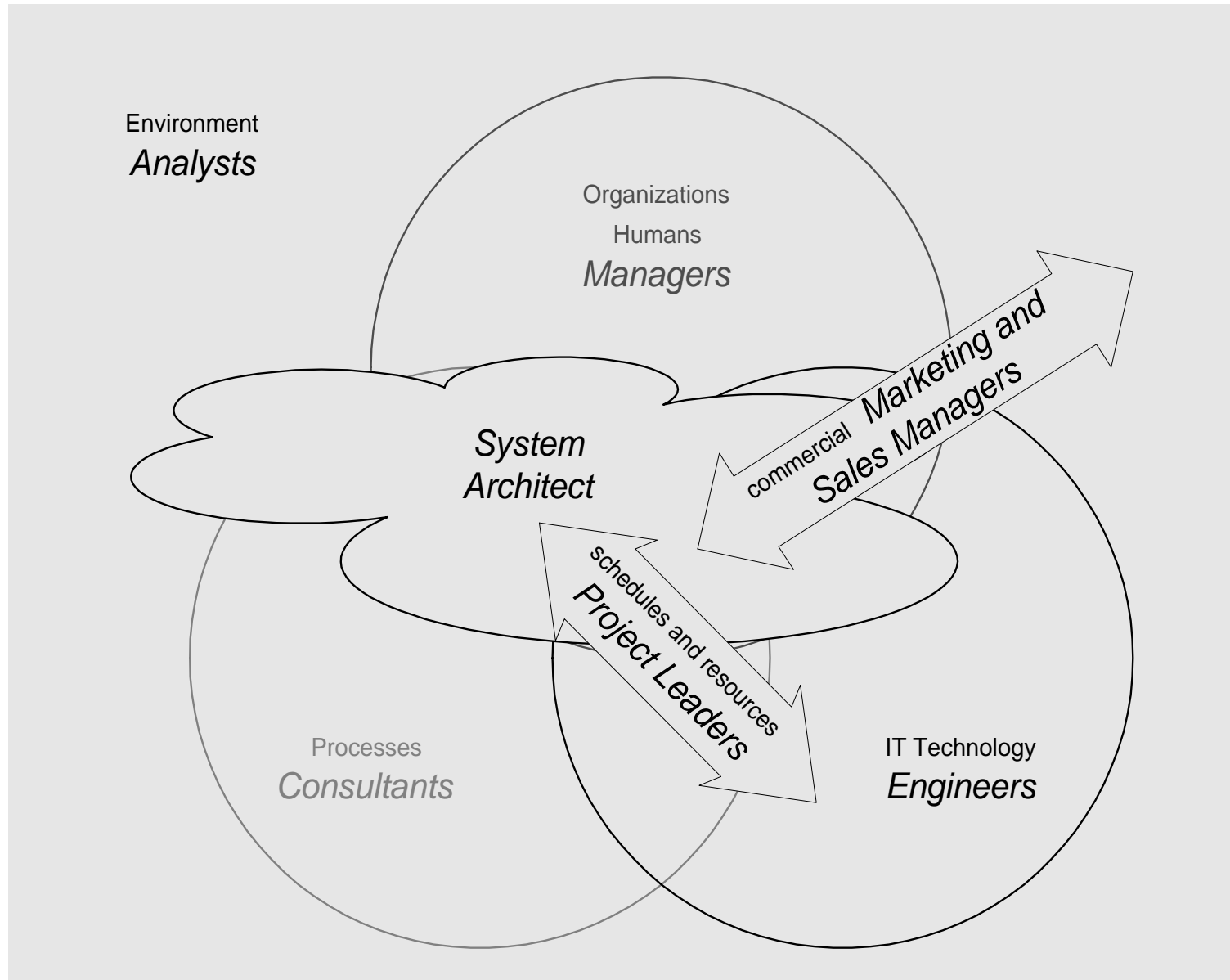
Interacting subsystems of a total system



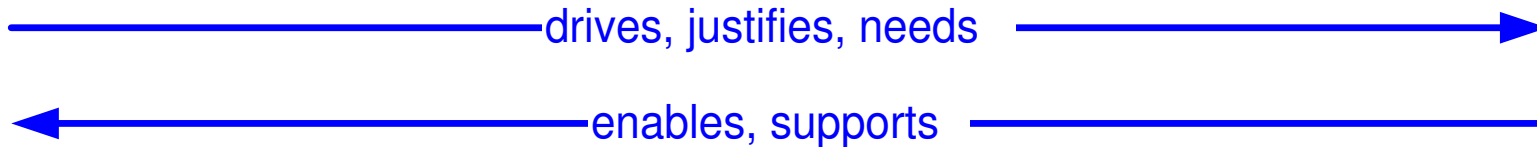
Characteristics of subsystems in the environment



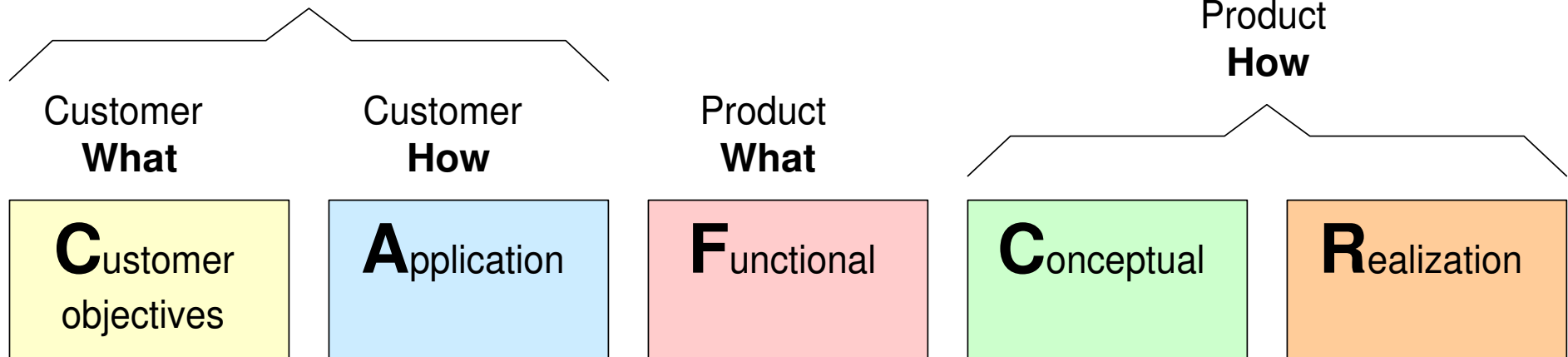
Roles and Responsibilities



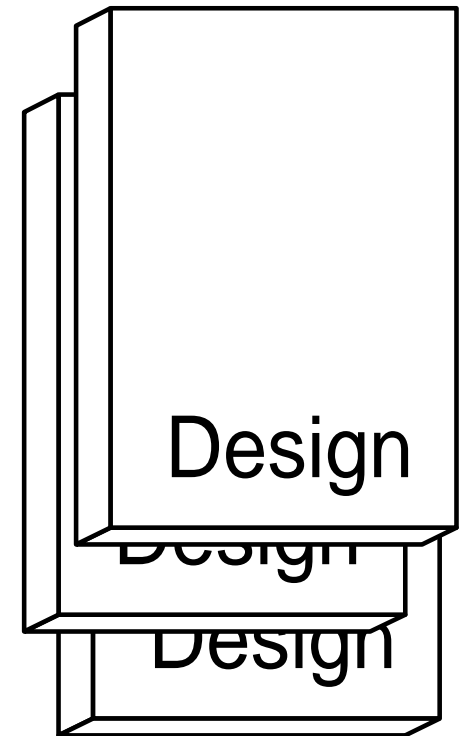
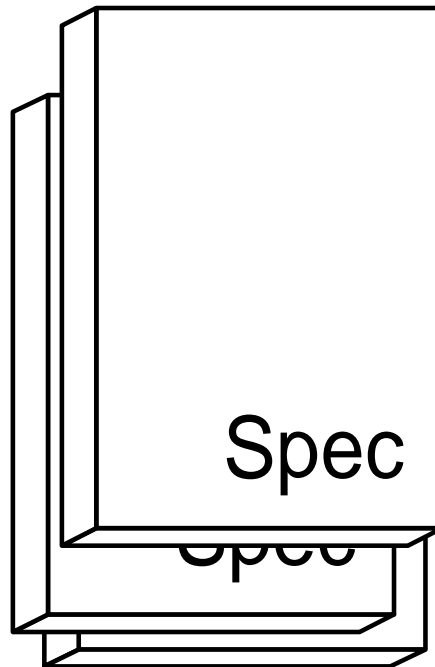
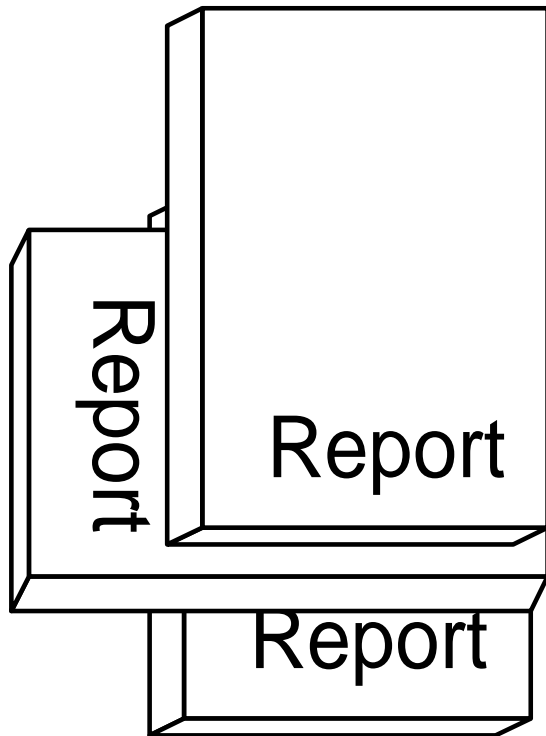
System Architect integrates 5 viewpoints



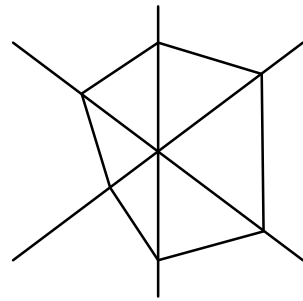
What does Customer need
in Product and **Why?**



Deliverables of a System Architect

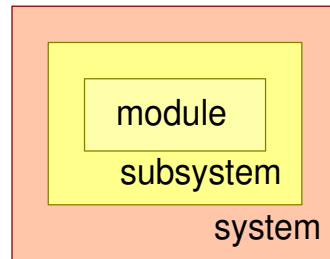


Responsibilities of a System Architect



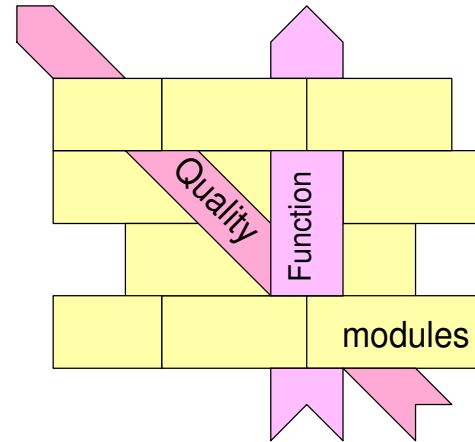
Balance

Requirement
Spec
Design
Realization



Consistency

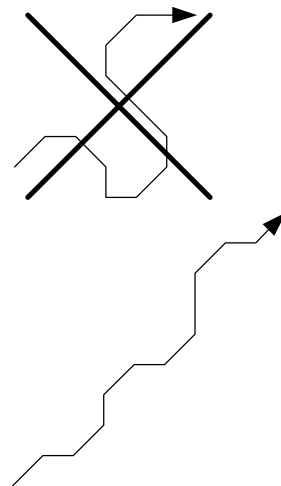
Decomposition
Integration



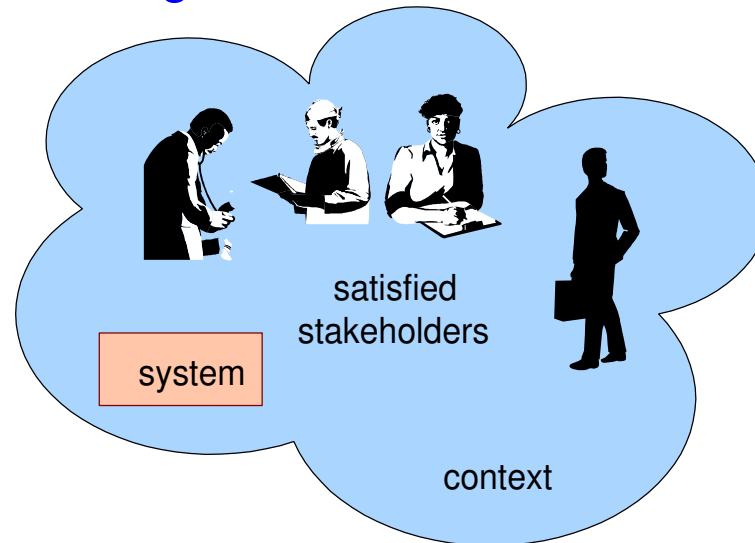
Overview

KISS

Elegance
Simple



Integrity

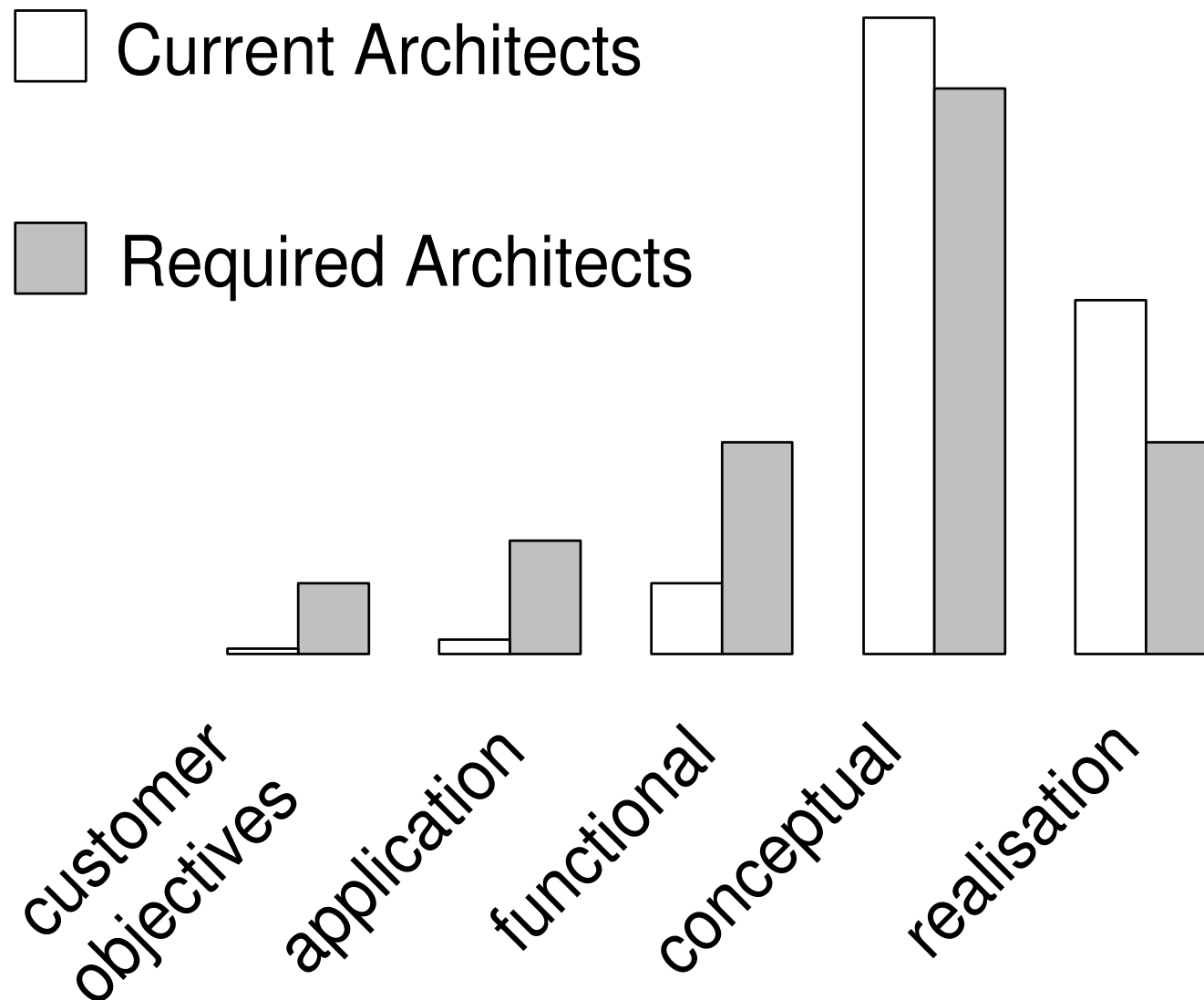


Fitting

Bottom-up elicitation of system characteristics

		Quantity per year (order-of- magnitude)	architect time per item
consolidation in deliverables meetings informal contacts sampling scanning	→ driving views	10	100 h
	→ shared issues	10^2	1 h
	→ touched details	10^4	0.5 – 10 min
	→ seen details	$10^5 - 10^6$	0.1 – 1 sec
	→ product details	$10^7 - 10^{10}$	
	real-world facts	infinite	

Architects must increase customer side contribution



Conclusion

- Present-day IT systems cause problems.
- The design must take **humans** and **processes** into account.
- The **system architect** is instrumental as **integrator**.

- The focus of the architect must be on **stakeholders** instead of technology.
- But also **users** have their own **responsibility** in the selection and use of technological means.
- Literature propagates **business drivers, strategies** and **processes** as driving force.

The most important driver....

The way humans

feel, think and behave,

human norms, values, preferences and objections

Working group "Human Values & IT"

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- Jaap van Rees (Van Rees adviesbureau),
- Jeroen van Hoven (Erasmus University Rotterdam),
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- Gerrit Muller (Philips Research)