Architecting User Value:

From technical Engineering to Value Engineering

Dieter K.Hammer

Department of Computer Science,

Eindhoven University of Technology

Gerrit Muller

Philips Research

Eindhoven

Kees van Overveld

Stan Ackermans Institute

Eindhoven University of Technology

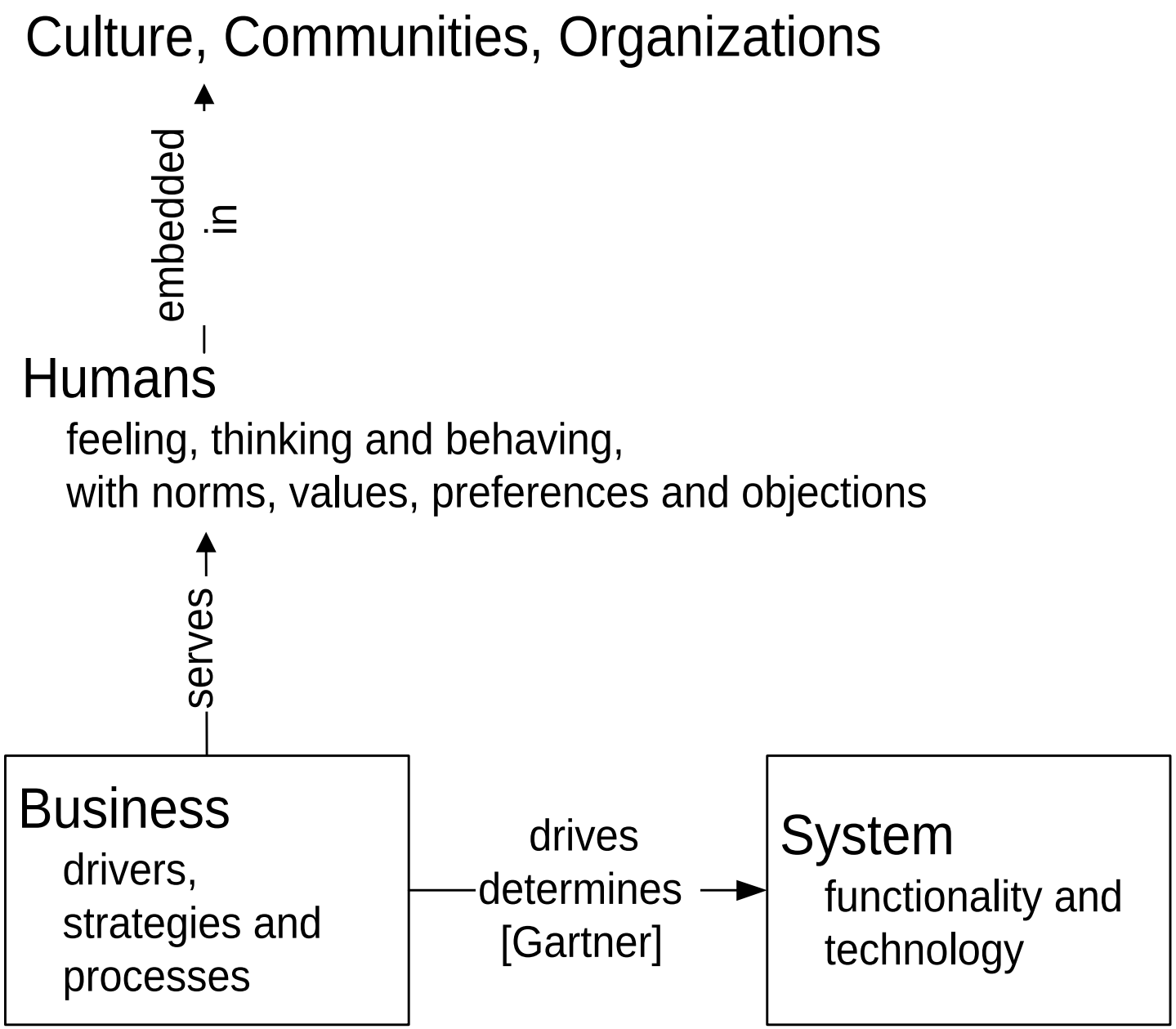
Members of the working group ”Human Values & IT”

October 20, 2017 version: 0.4

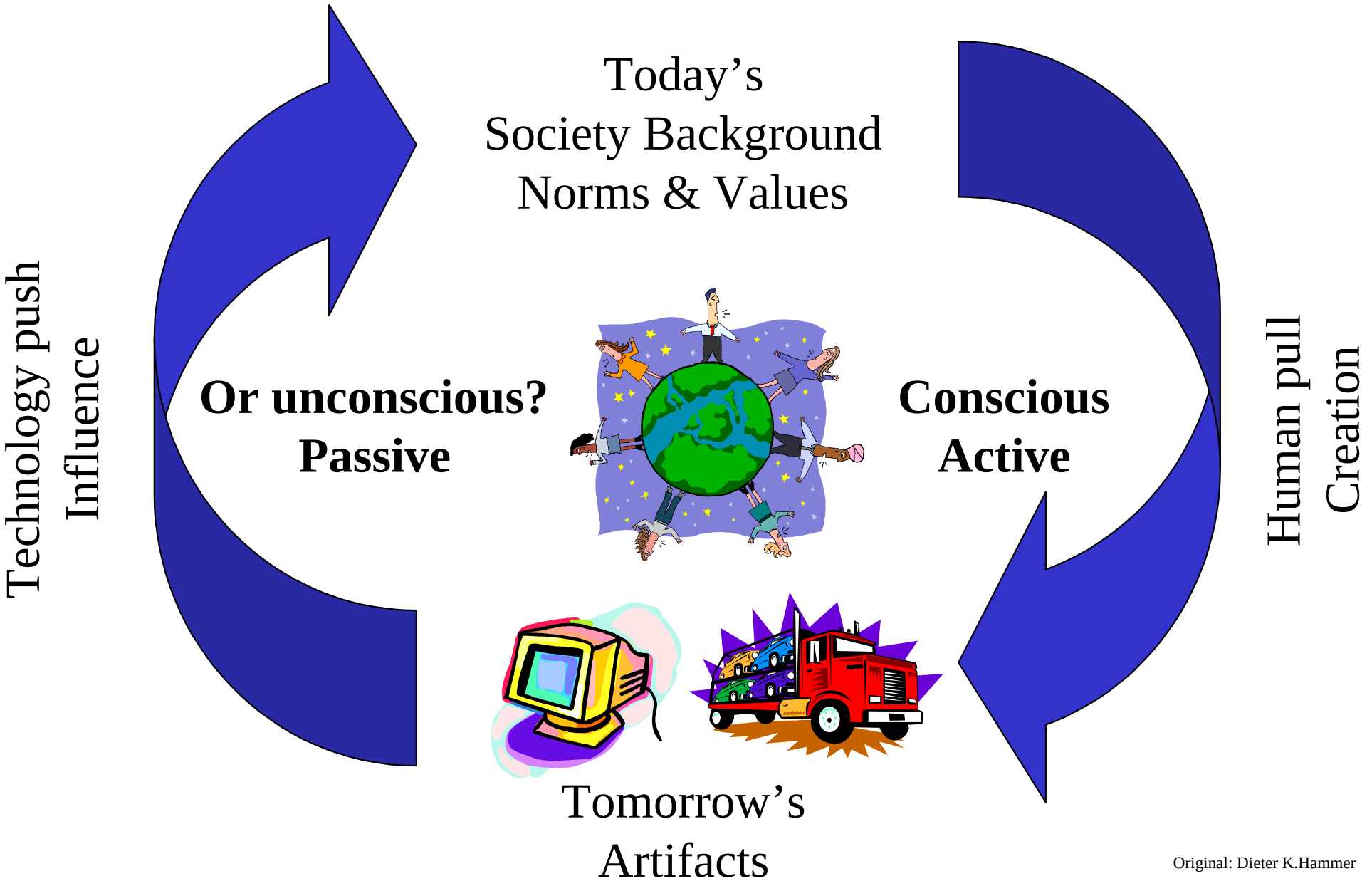
Abstract

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

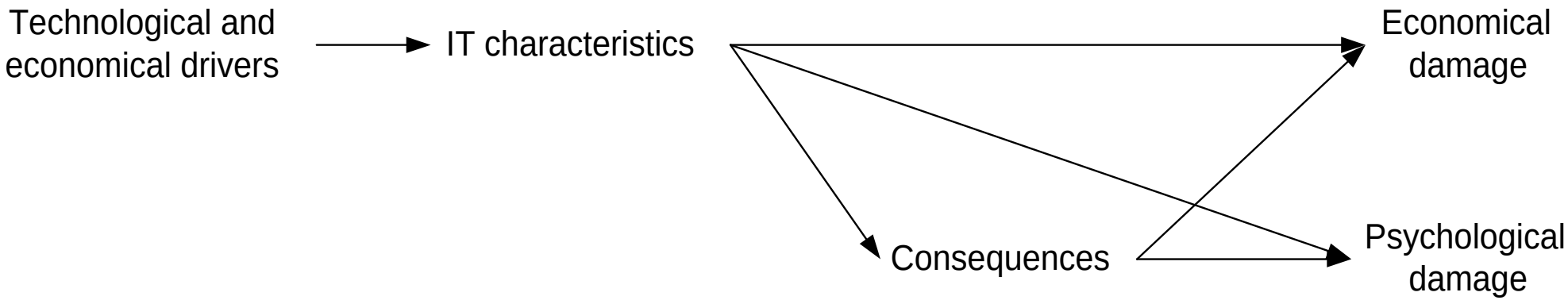


The Janus face of technology



Original: Dieter K.Hammer

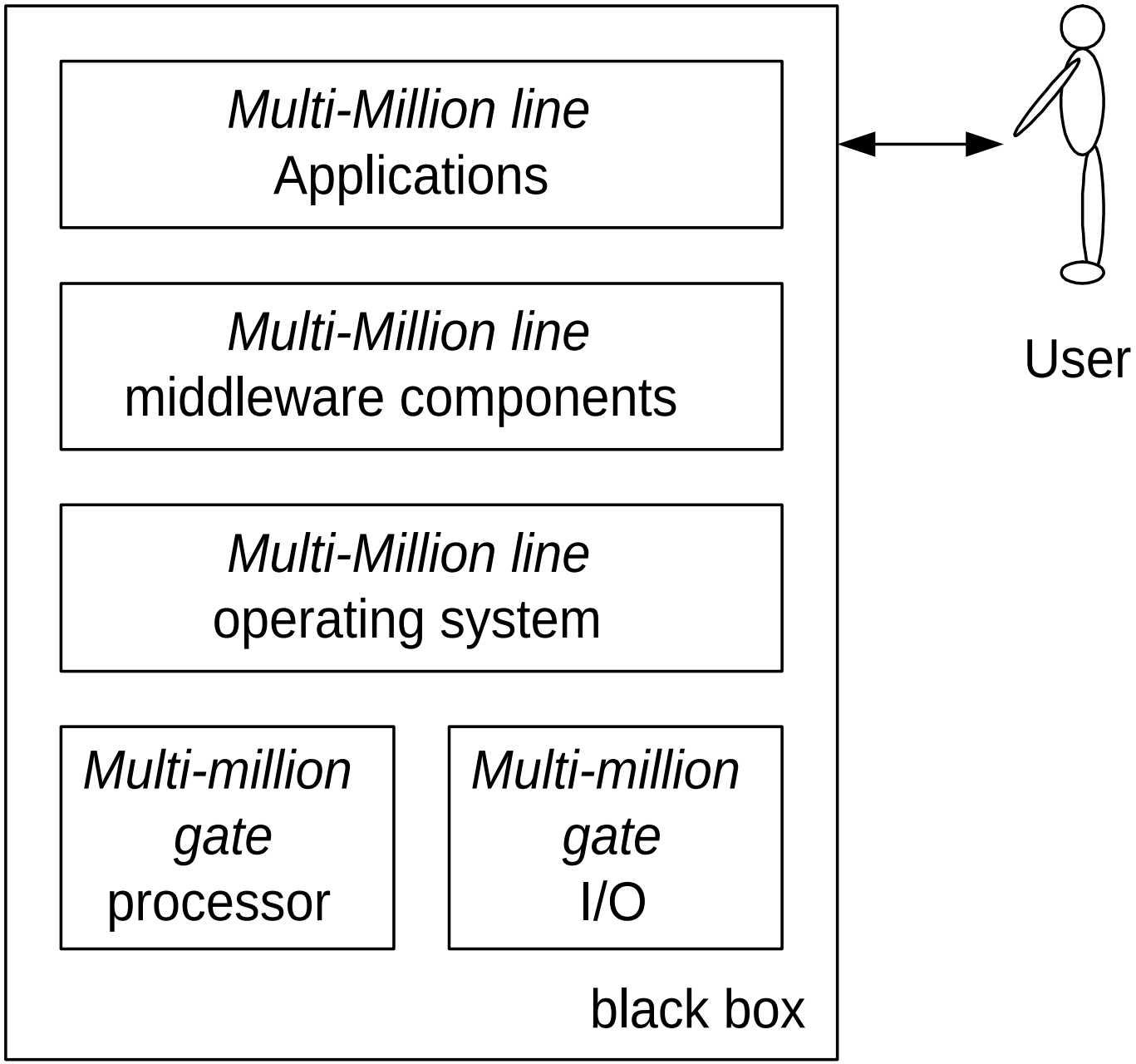
Cause Analysis of today's IT problems



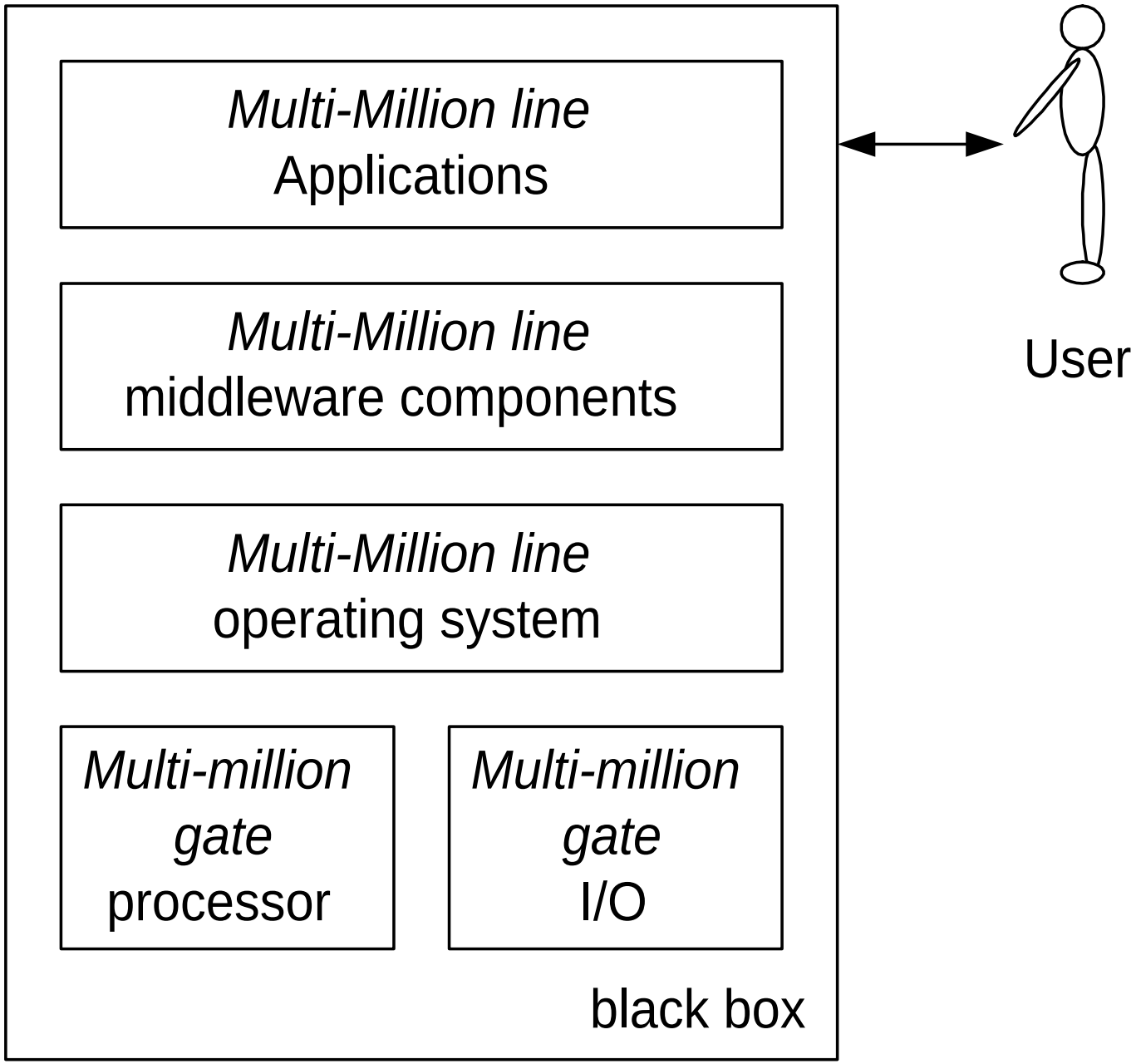
IT characteristics

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

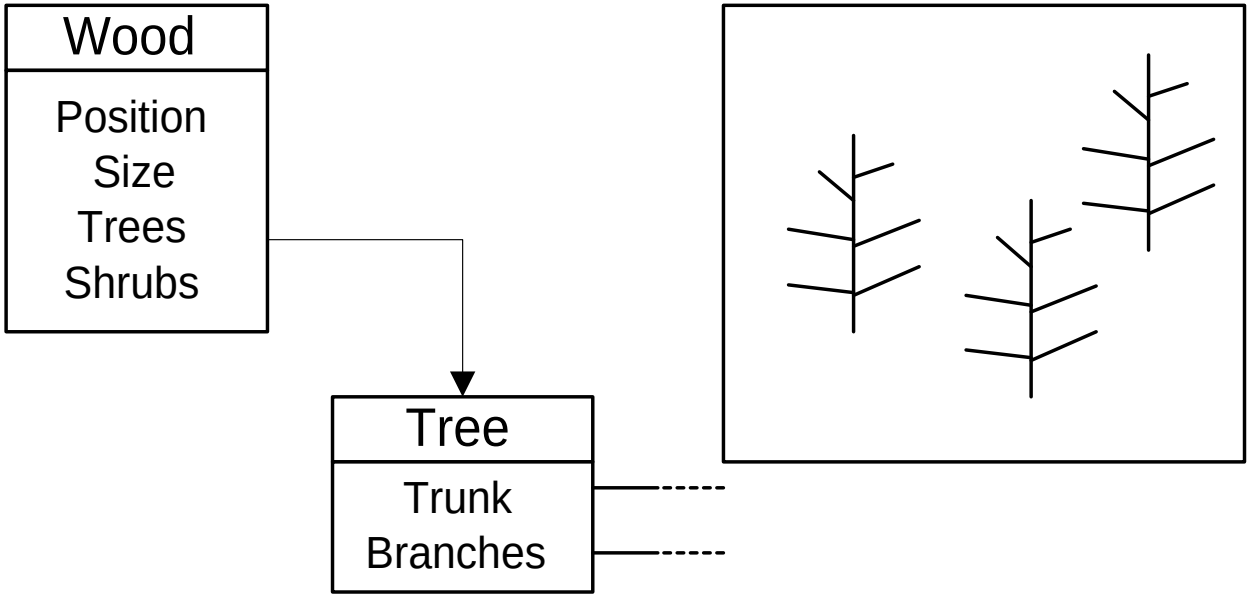
Complexity


Multi-Million line
Applications
Multi-Million line
middleware components
Multi-Million line
operating system
Multi-million gate
processor
Multi-million gate
I/O
black box
User

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

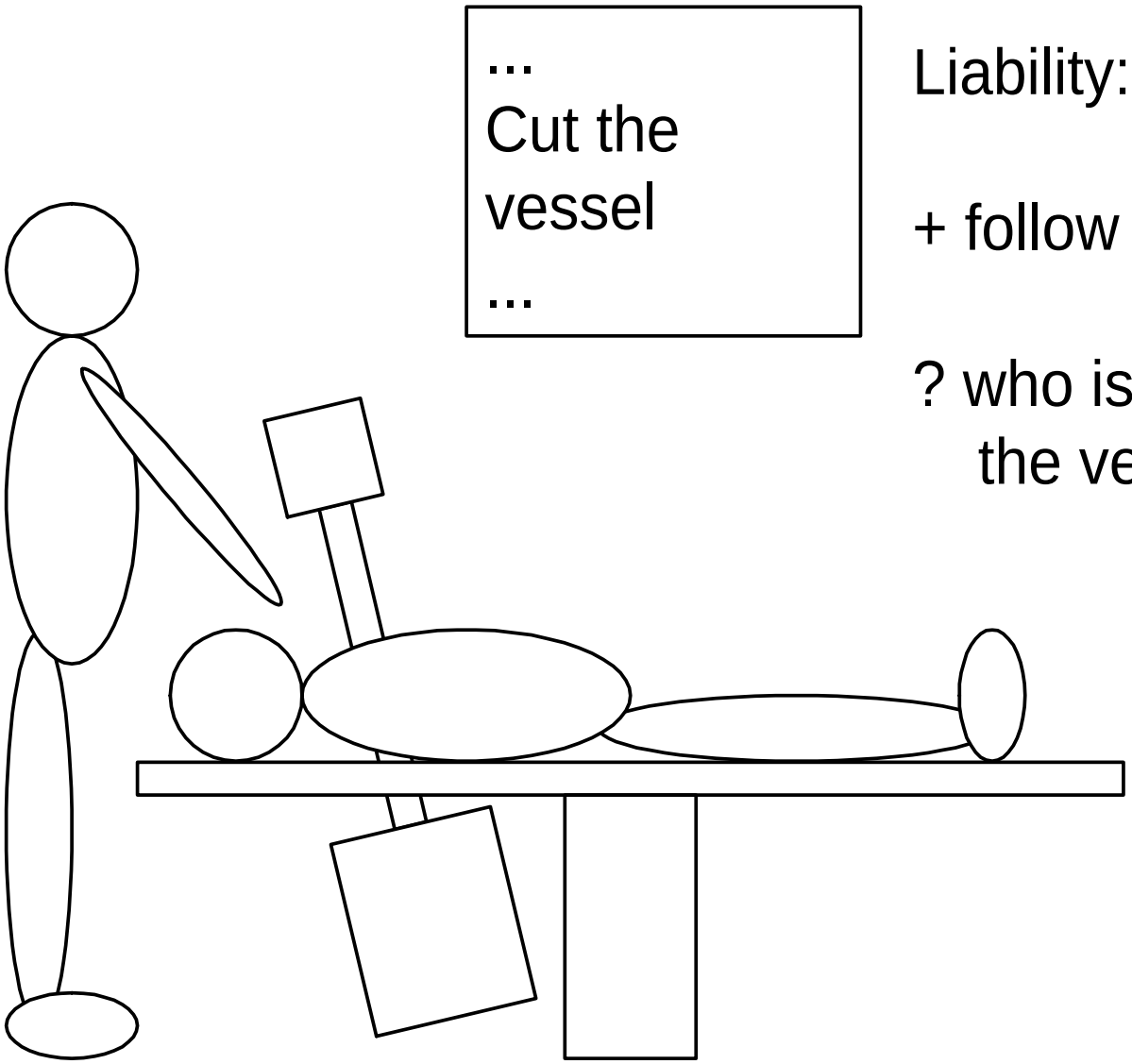
Multi-Million line
middleware components

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

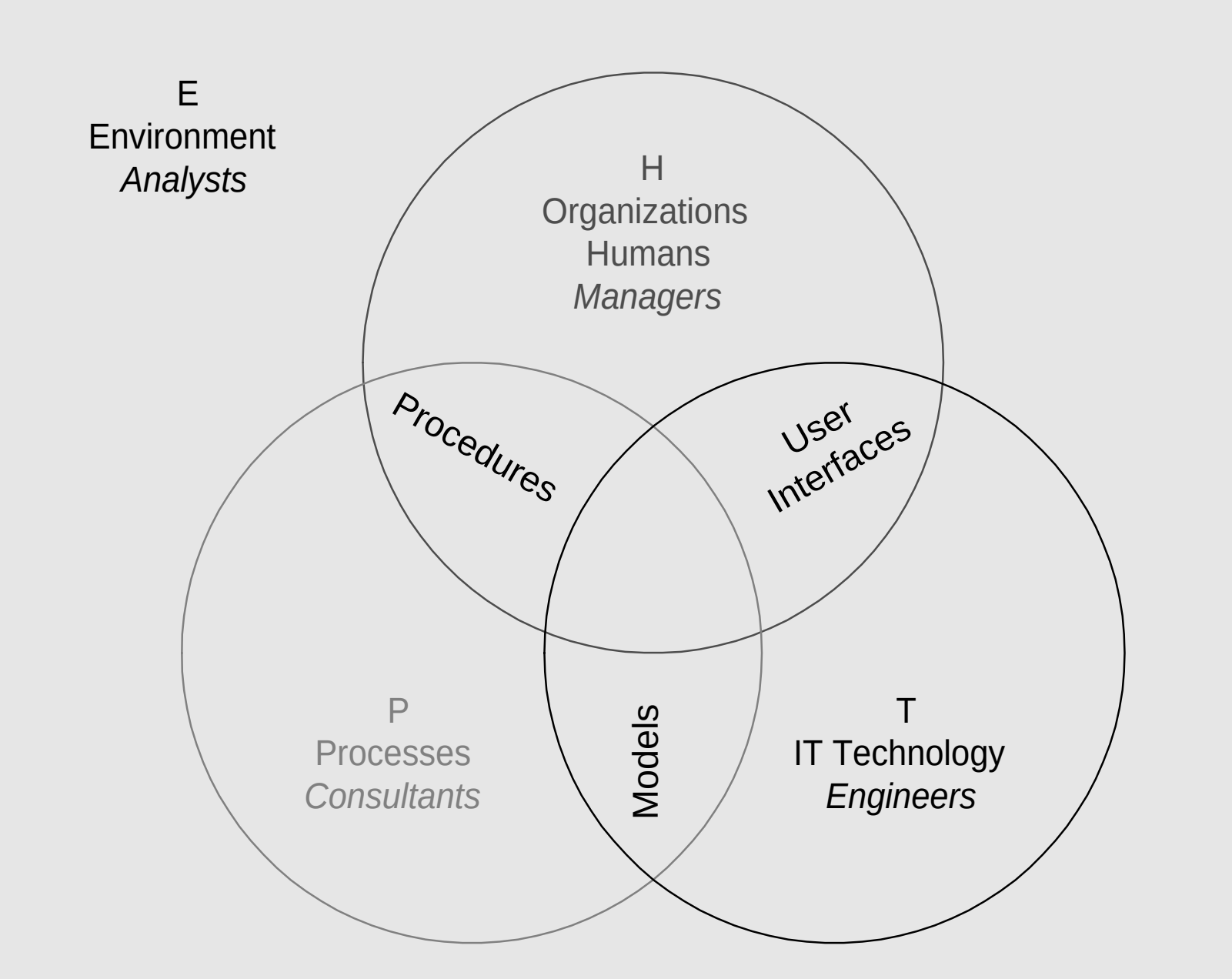
Denver Airport: Luggage handling

- 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

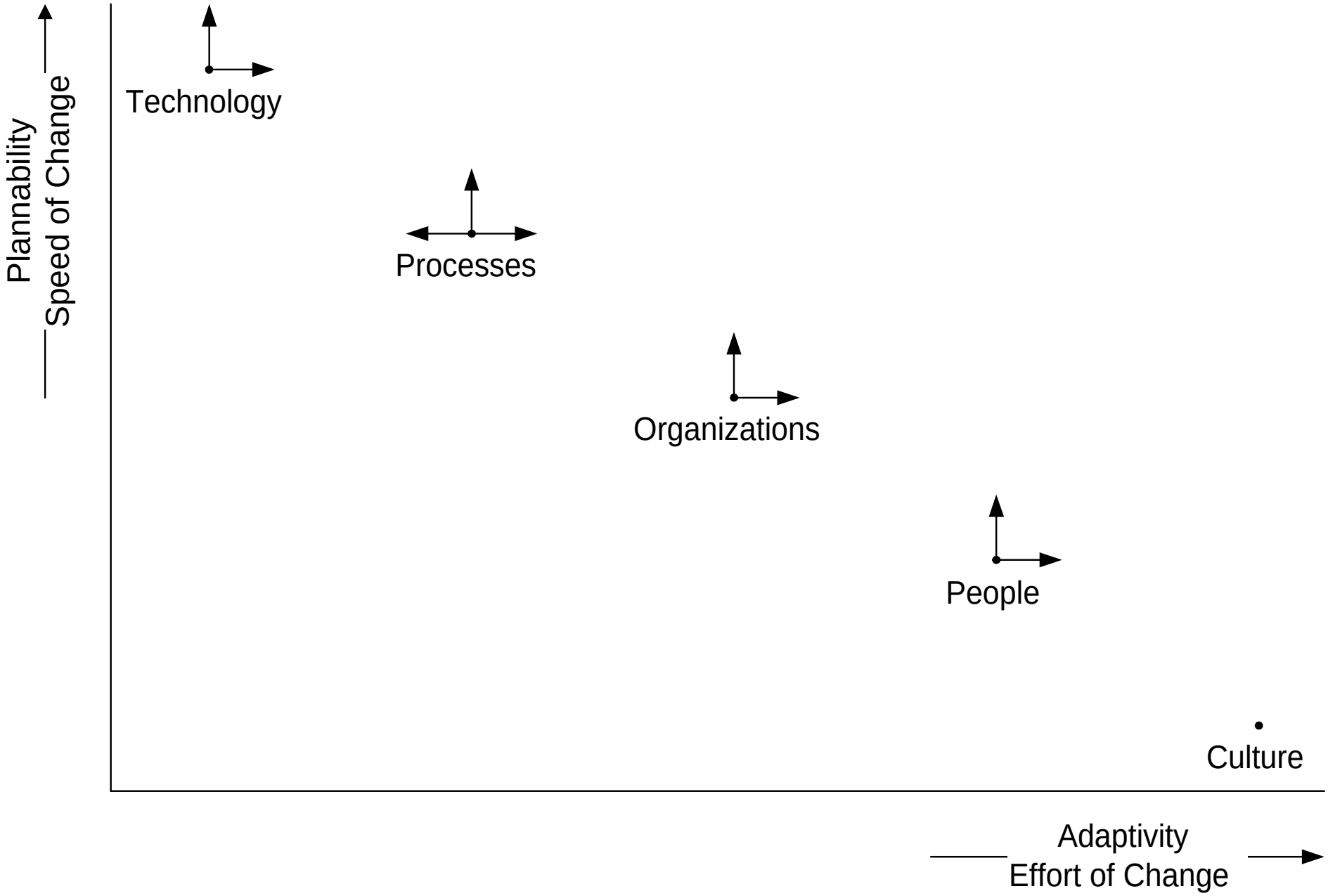
Psycho-social damage

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

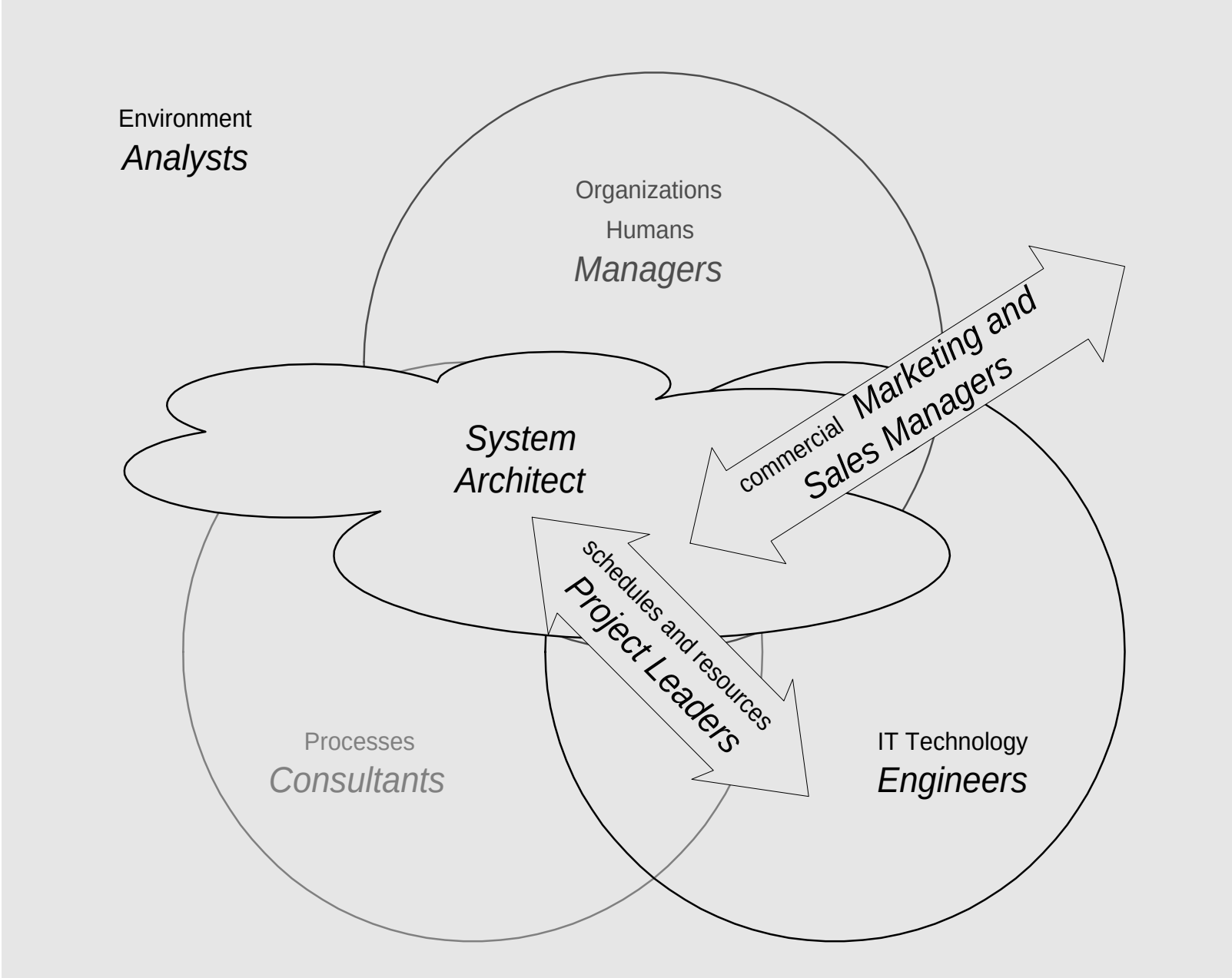
Interacting subsystems of a total system



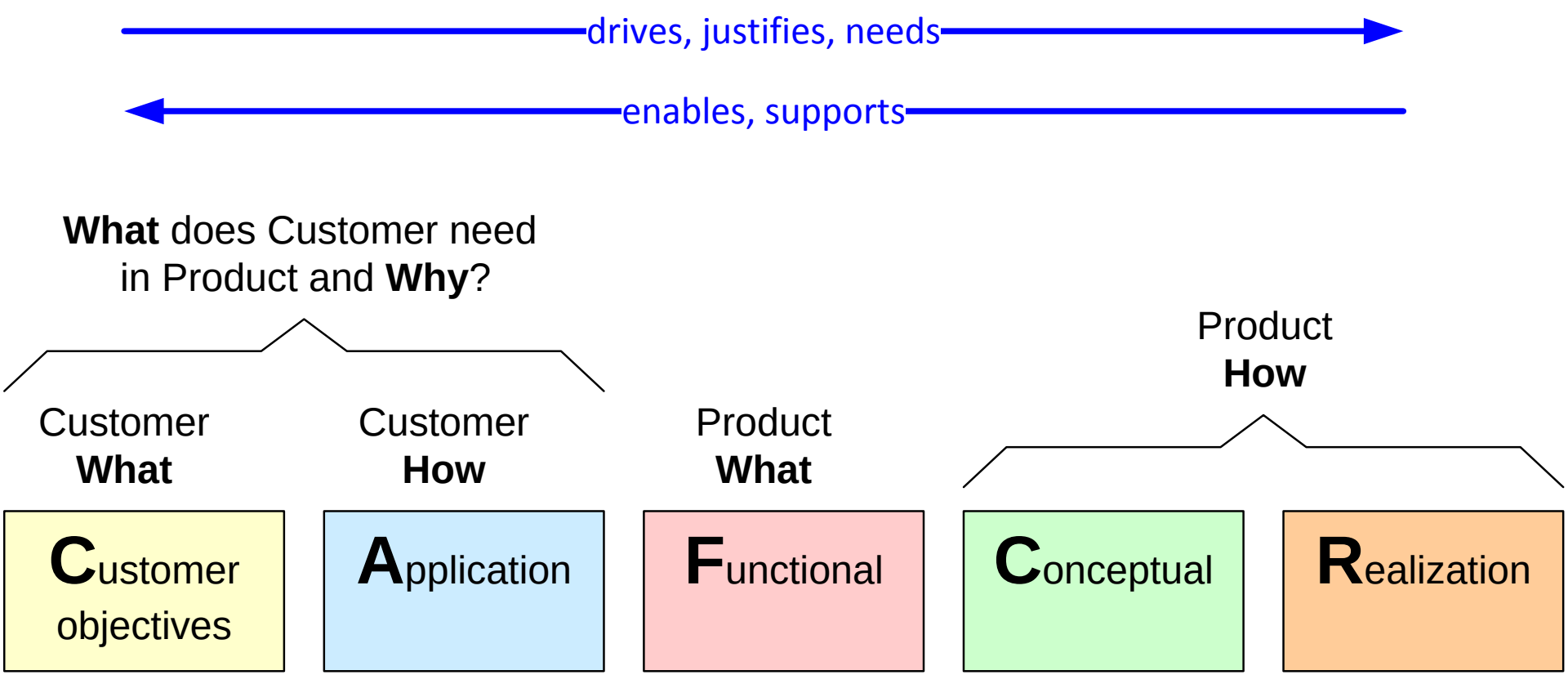
Characteristics of subsystems in the environment



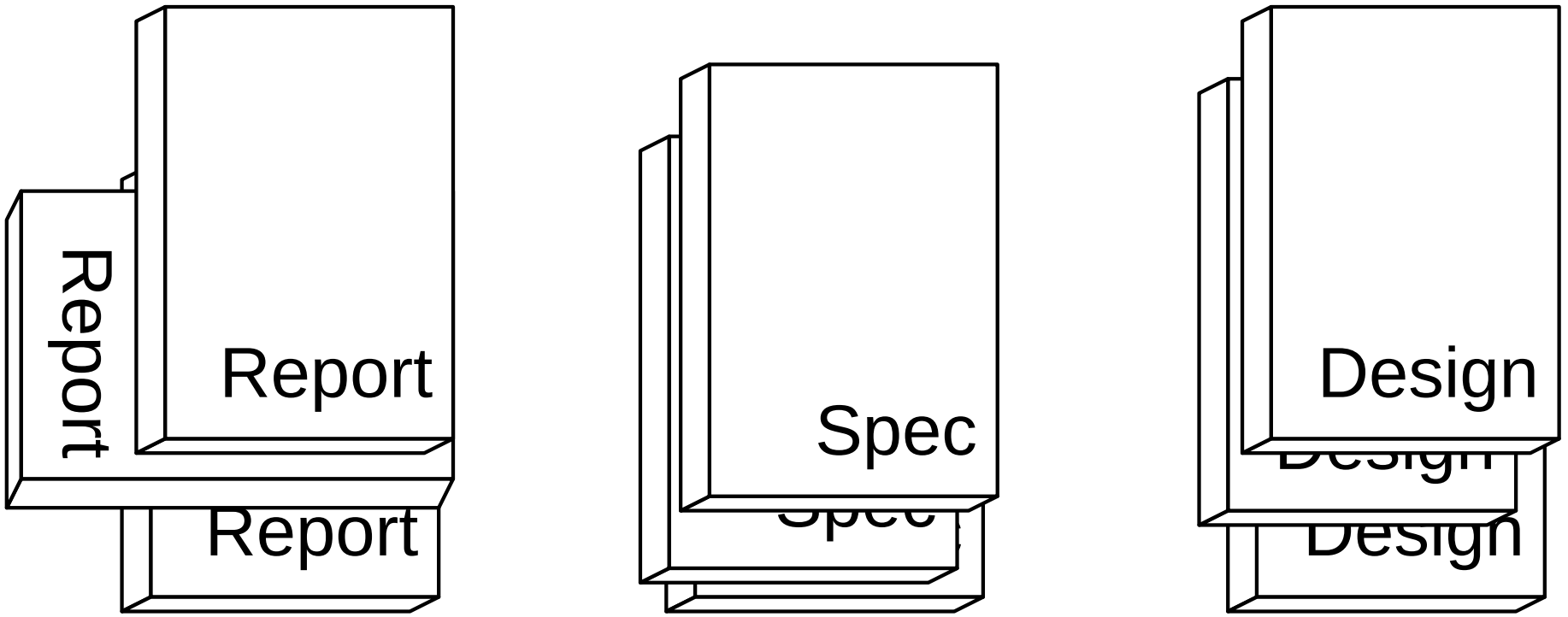
Roles and Responsibilities



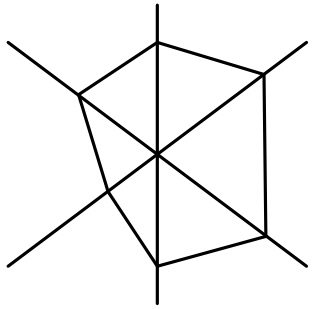
System Architect integrates 5 viewpoints



Deliverables of a System Architect

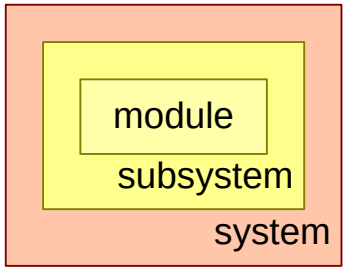


Responsibilities of a System Architect

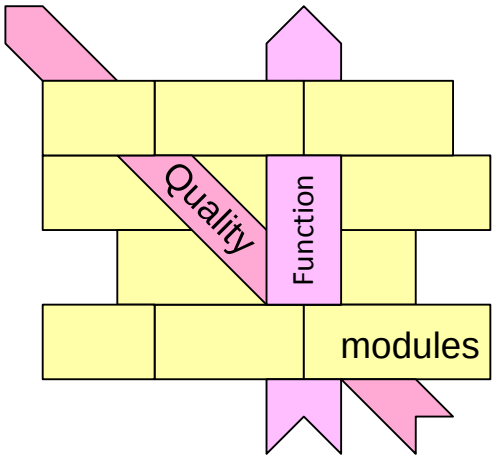


Balance

Requirement
Spec
Design
Realization



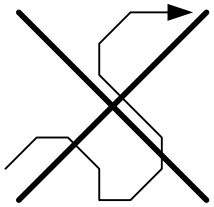
Consistency

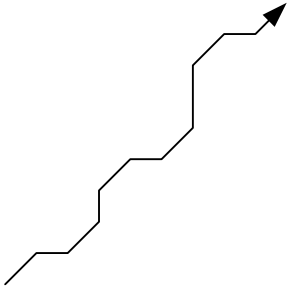


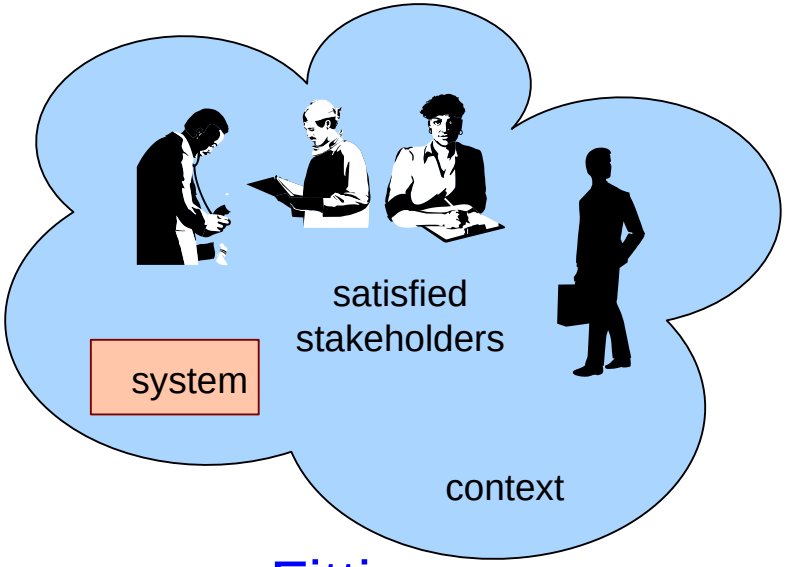
Decomposition
Integration

Overview

KISS





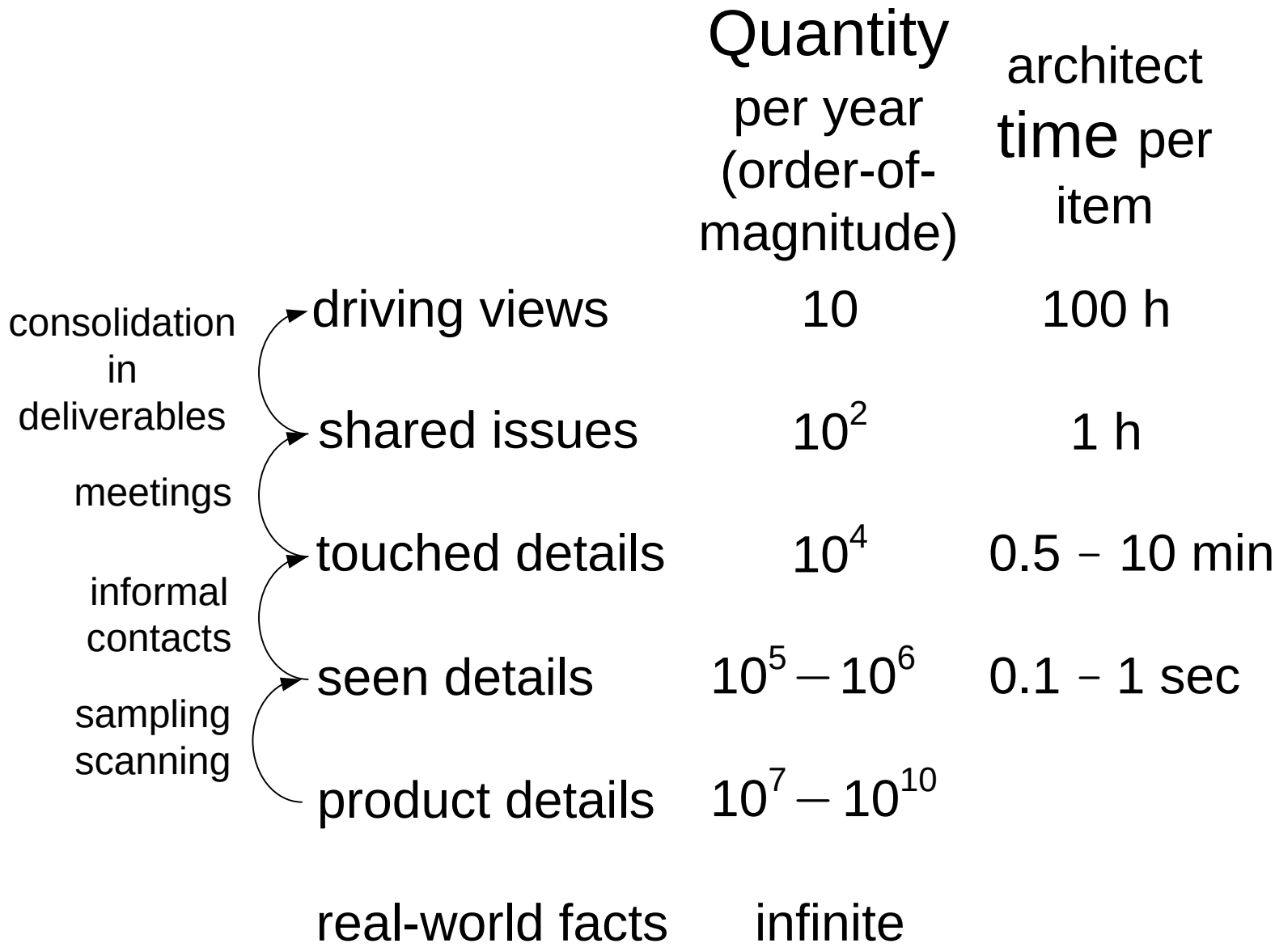


Elegance
Simple

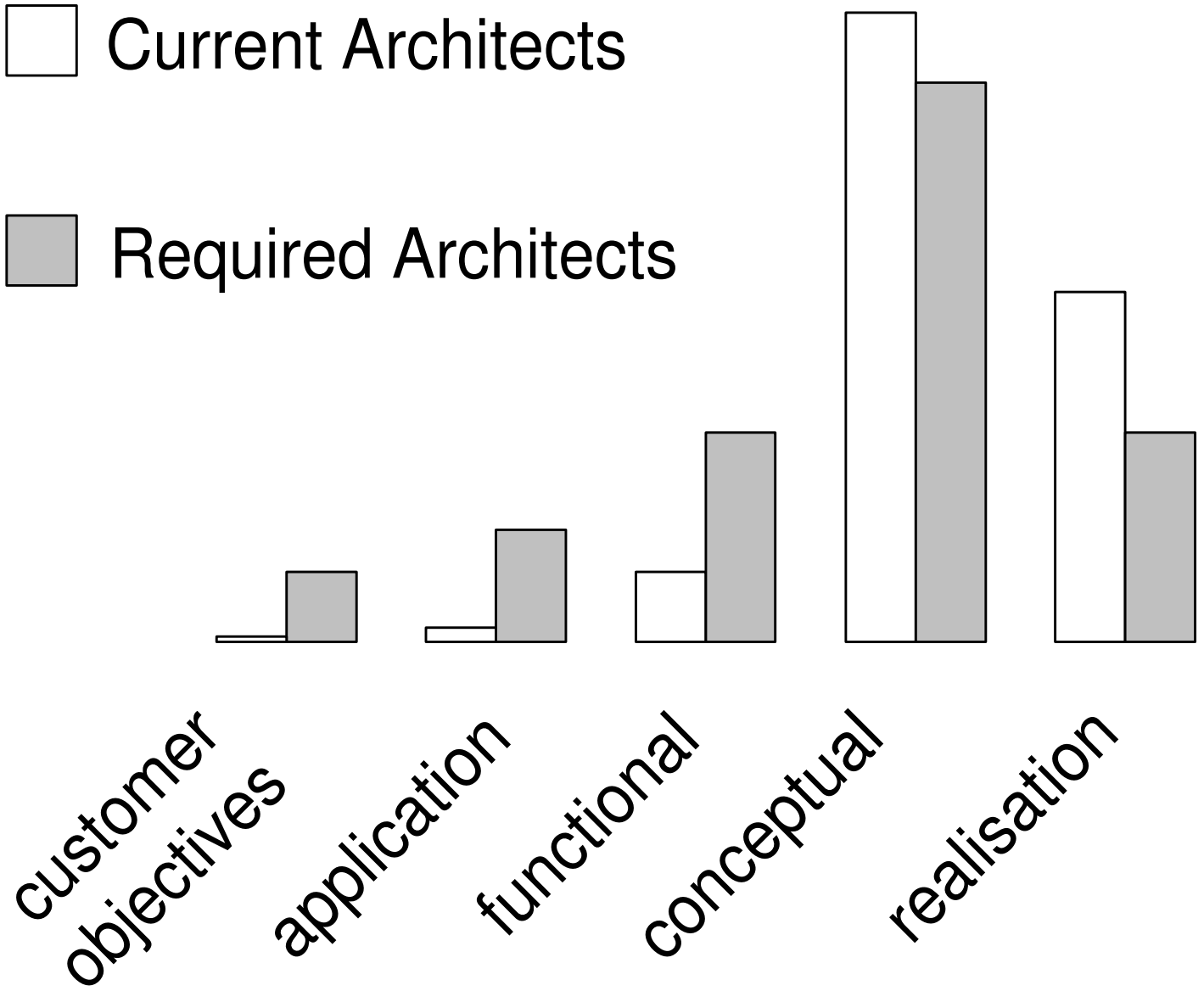
Integrity

Fitting

Bottom-up elicitation of system characteristics



Architects must increase cuctomer 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”

- Dieter Hammer (Technical University Eindhoven),
- Jaap van Rees (Van Rees adviesbureau),
- Jeroen van Hoven (Erasmus University Rotterdam),
- Kees van Overveld (Stan Ackermans Institute/TUE),
- Daan Rijsenbrij (Cap Gemini),
- Nathalie Masseus (Cap Gemini),
- Gerrit Muller (Philips Research)