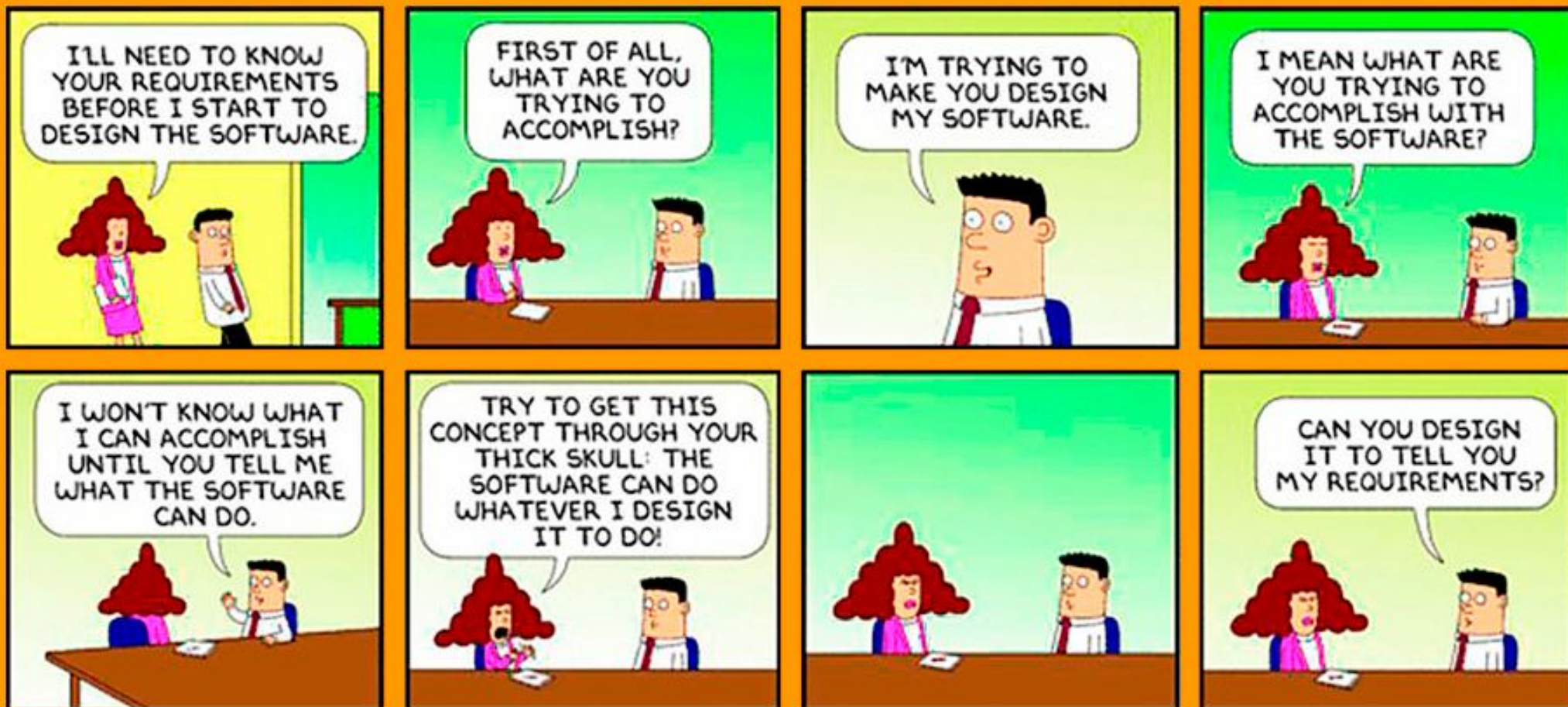




Requirements Before Development

Business Requirements

Gytis Gurklys, BNM, Franmax, 2018-12-20

The Purpose Of The Presentation

- The results of reasoning about BRs in FRM/M environment
- **Yes | Yes, but | Not Sure | No decision** by stakeholders (BNMs/BPOs/PMs(?))
- Side effect: after the presentation you should be able to answer the questions
 - What business requirements are and what are not?
 - What are the ways to document BRs

REQUIREMENTS PROBLEM & REQUIREMENTS ENGINEERING

The Requirements Problem

The requirements problem: the good old time...

- ◆ Poor requirements are ubiquitous ...
"requirements need to be *engineered*
and have continuing review & revision"
(Bell & Thayer, empirical study, 1976)
- ◆ Prohibitive cost of late correction ...
"up to 200 x cost of early correction"
(Boehm, 1981)
- ◆ RE is hard & critical ...
"hardest, most important function of SE is the
iterative *extraction & refinement* of requirements"
(Brooks, 1987)

[1] 2

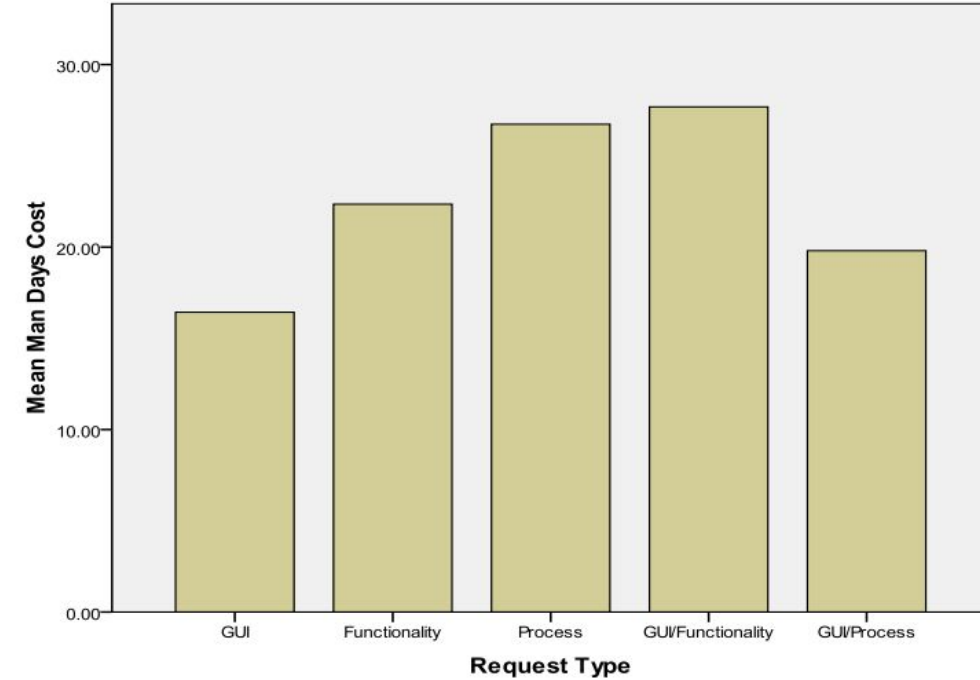
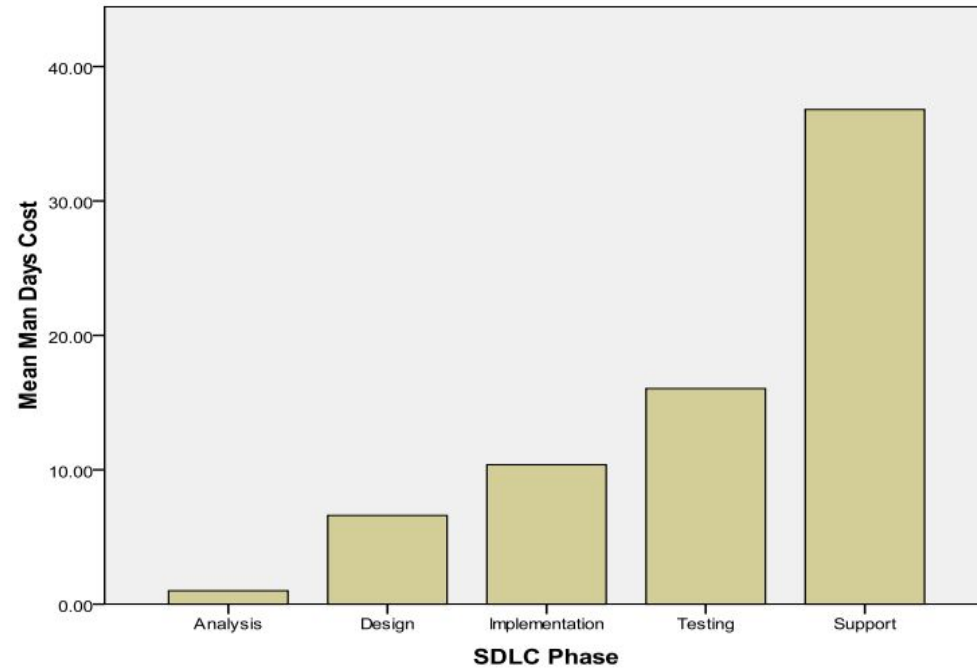
The requirements problem: more recently ...

- ◆ Survey of 3800 EUR organizations, 17 countries
main software problems are in...
 - requirements specification
> 50% responses
 - requirements management
50% responses
(European Software Institute, 1996)

[1] 5

The Requirements Problem

PROVEN



[2] Sharif, Bushra & Shoab, A & , Khan & Wasim Bhatti, Muhammad. (2012). Measuring the Impact of Changing Requirements on Software Project Cost: An Empirical Investigation. International Journal of Computer Science Issues. 9.

Requirements Engineering

- The primary measure of **success of a software system** is the degree to which it **meets the purpose** for which it was intended. Broadly speaking, software systems **requirements engineering** (RE) is the process of **discovering** that purpose, by identifying **stakeholders** and their **needs**, and **documenting** these in a form that is amenable to **analysis**, **communication**, and subsequent **implementation**.

[3] Nuseibeh, B.; Easterbrook, S. (2000). Requirements engineering: a roadmap (PDF). ICSE'00. Proceedings of the conference on the future of Software engineering. pp. 35–46.

Requirements Engineering

- Discover the purpose
- Identify stakeholders needs
- Document
- Analyze
- Communicate
- (Manage)

The Object of RE Process

- The object of RE is Software (System) Requirements
- What about Business Requirements?
 - No consensus on that, but generally accepted Business Analyst (BA) role description includes BRs.

BNM Role

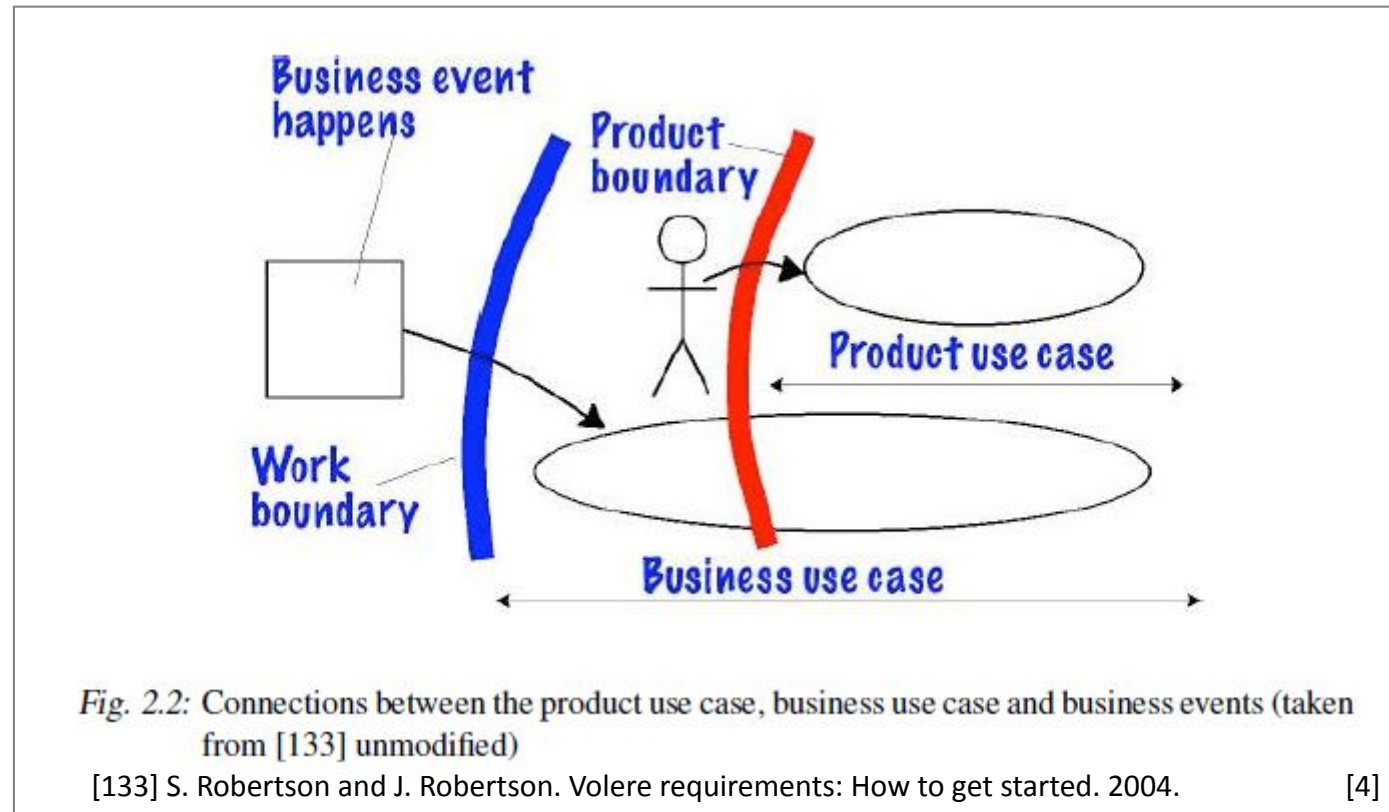
- ***1.2. to analyze and accumulate new business requirements***
 - As a BNM how do I
 - Discover the purpose
 - Identify stakeholders needs
 - Document
 - Analyze
 - Communicate
 - (Manage)

REQUIREMENTS APPROACHES

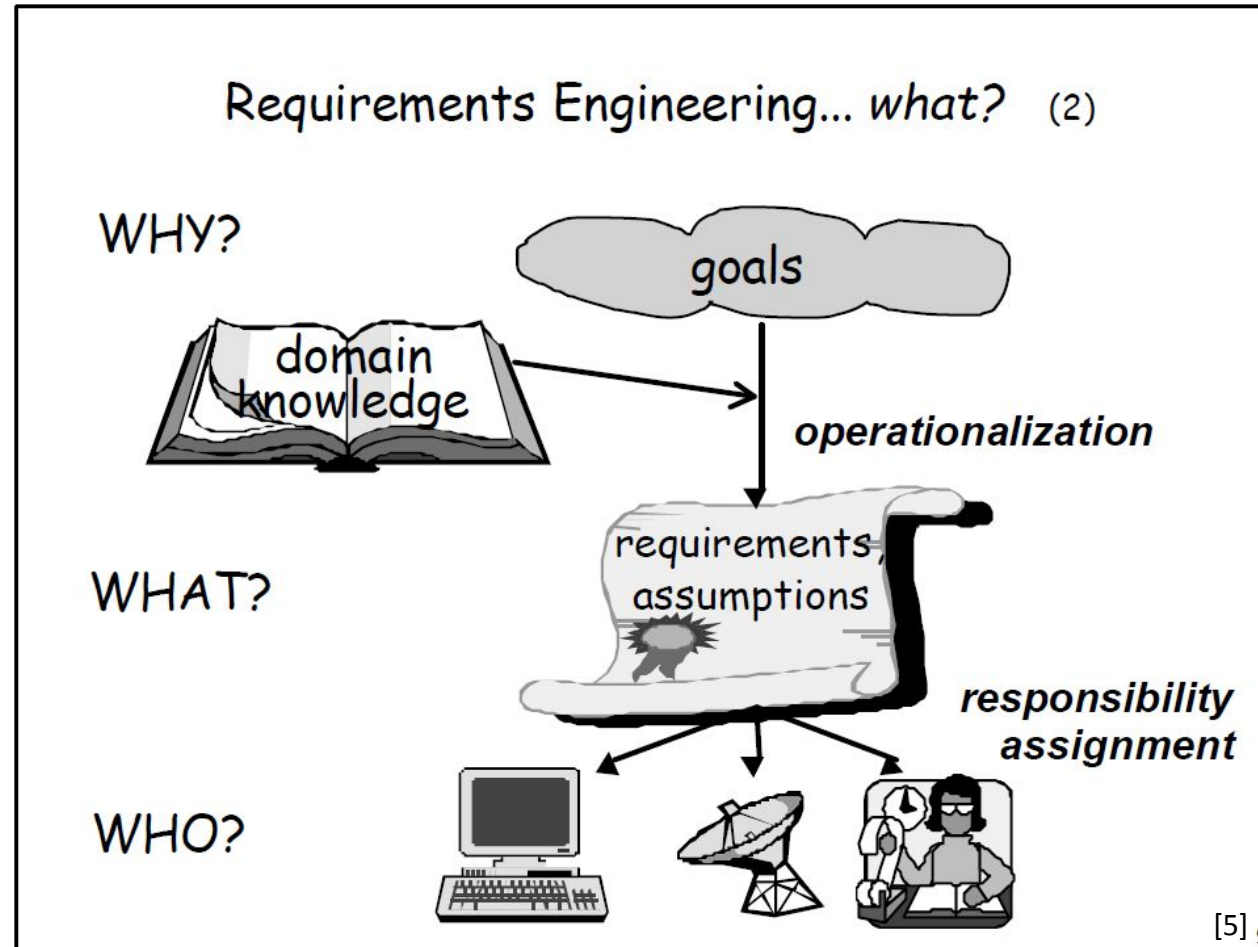
RE Approaches

- Narrative
 - Use Cases
 - Scenarios (user stories)
- Goal-oriented
 - KAOS
 - i*/Tropos
 - NFR
 - GBRAM
- Problem-based
 - (Jackson) Problem Frames

Use Cases

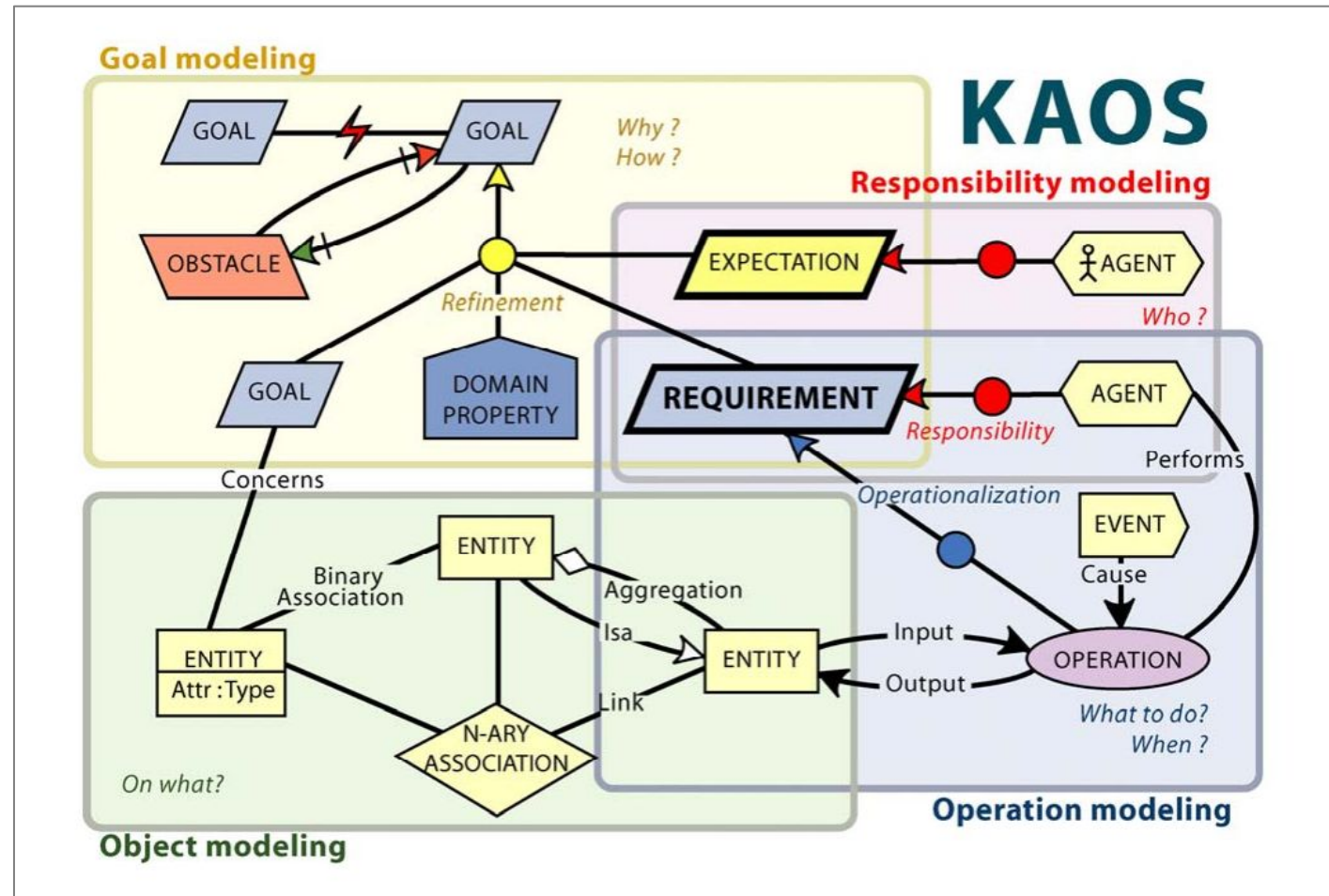


GORE Approach



[5] Goal-Oriented Requirements Engineering: from System Objectives to UML Models to Precise Software Specifications, Axel van Lamsweerde, University of Louvain, 2003

KAOS – Knowledge Acquisition in autOmated Specification



KAOS Goal Model Example

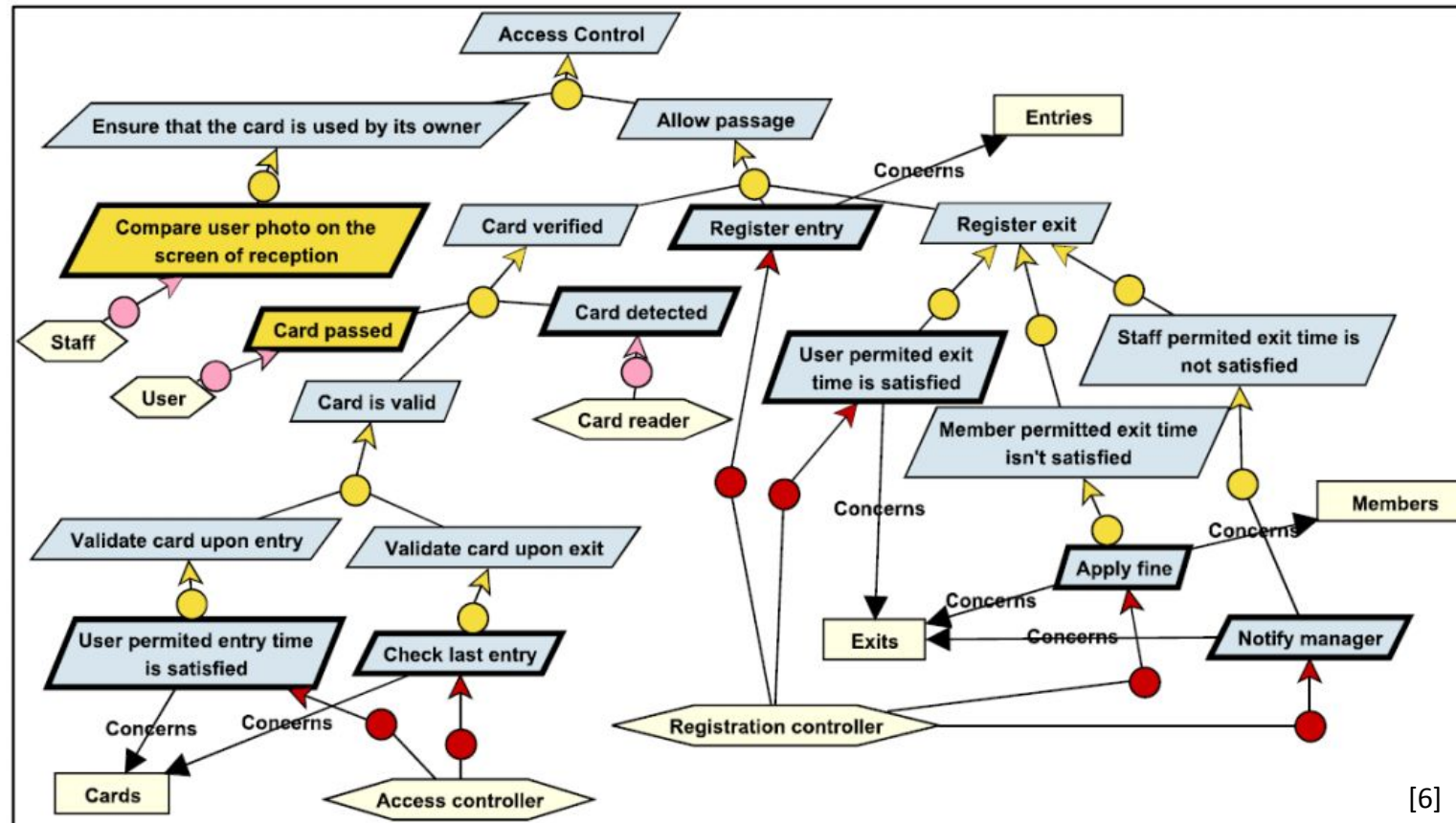
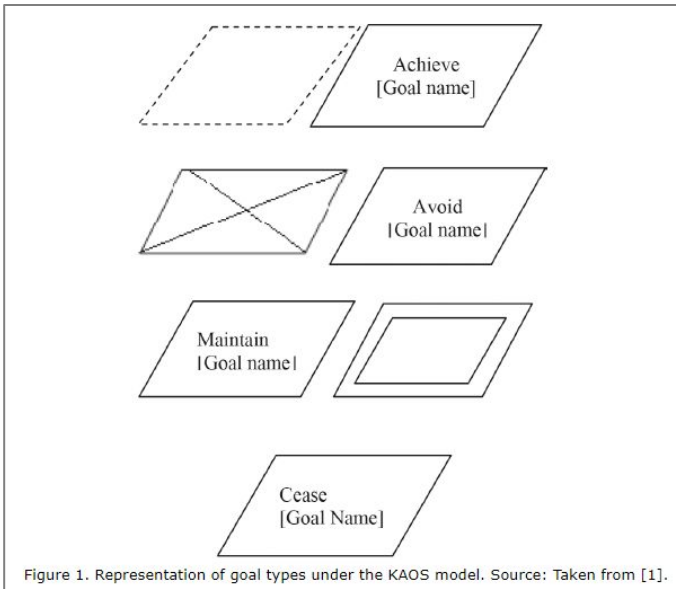


FIGURE 3. REFINED ACCESS CONTROL GOAL MODEL

KAOS Goal Types



- KAOS Goals are desired system properties that have been expressed by some stakeholders.
- KAOS Requirement – a goal to be achieved by software agent
- Goal types
 - Achieve
 - Avoid
 - Maintain
 - Cease

Problem Frames

- Our subject is
 - An intellectual framework for thinking about problems and solutions in software engineering
 - A way of characterising problems and the concerns they raise for software engineers
 - An evolving repertoire of ways of understanding development techniques and difficulties

Problem Frames Concepts

Software Development Problems

- Controlling traffic lights
- Supporting the administration of a library
- Controlling use of a car park
- Invoicing electricity consumers
- Monitoring patients in an intensive care unit
- Supporting web-based retail operations
- Controlling a lift
- Managing accounts in a bank
- Providing a tool for word processing
- Managing production in a factory
- Central locking in a car
-

[7]

A Problem Has a Problem World

- | | |
|--------------------------|---|
| • Control traffic lights | • Lights, roads, traffic, drivers, sensors, ... |
| • Administer a library | • Books, members, fines, catalogue, ... |
| • Web-based retailing | • Goods, delivery company, credit cards, ... |
| • Control a lift | • Doors, sensors, buttons, winding gear, users, ... |
| • Word processing | • Documents, users, ... |

[7]

PF Machine & Problem World

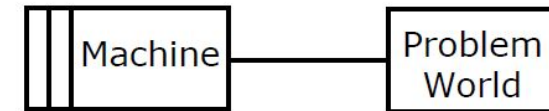
The Problem World Is Not the Software



- Software development is building a Machine
 - The developed software running on a computer
- The Machine is connected to the Problem World
 - The Traffic Lights Controller can switch the lights and can monitor the sensors
 - The Library Administration Machine can read bar-coded book cards and magnetic membership cards
 - The Lift Control Machine can turn the motor on, detect button presses, etc

[7]

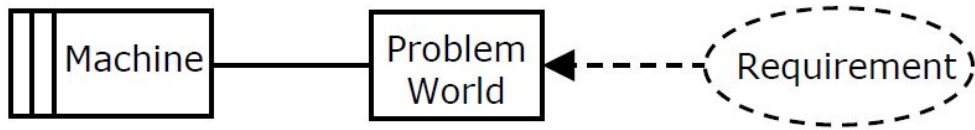
What Kind Of Problem World?



- PFs are (primarily) about problems with a **physical problem world**
 - Not about factorising prime numbers, finding the spanning tree of a graph, computing the convex hull of a set of points in 3D space, ...
- PFs are concerned with physical phenomena
 - A car is in the intersection
 - The book has been borrowed
 - The lift is at floor 2
 - The user has hit the 'Delete' key
- Relevant physical phenomena must be designated [7]

PF Requirements

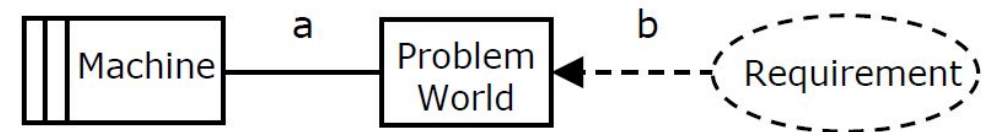
The Customer's Requirement



- The customer's requirement is a condition on the problem world, not on the machine
 - The lift comes when you call it
 - Books are lent only to members
 - Vehicle collisions are prevented
 - When you hit 'Delete' the selection (or the character after the cursor) is deleted from the text
 - Confirmed web purchases will be delivered
 - Electricity users are billed only for units used

[7]

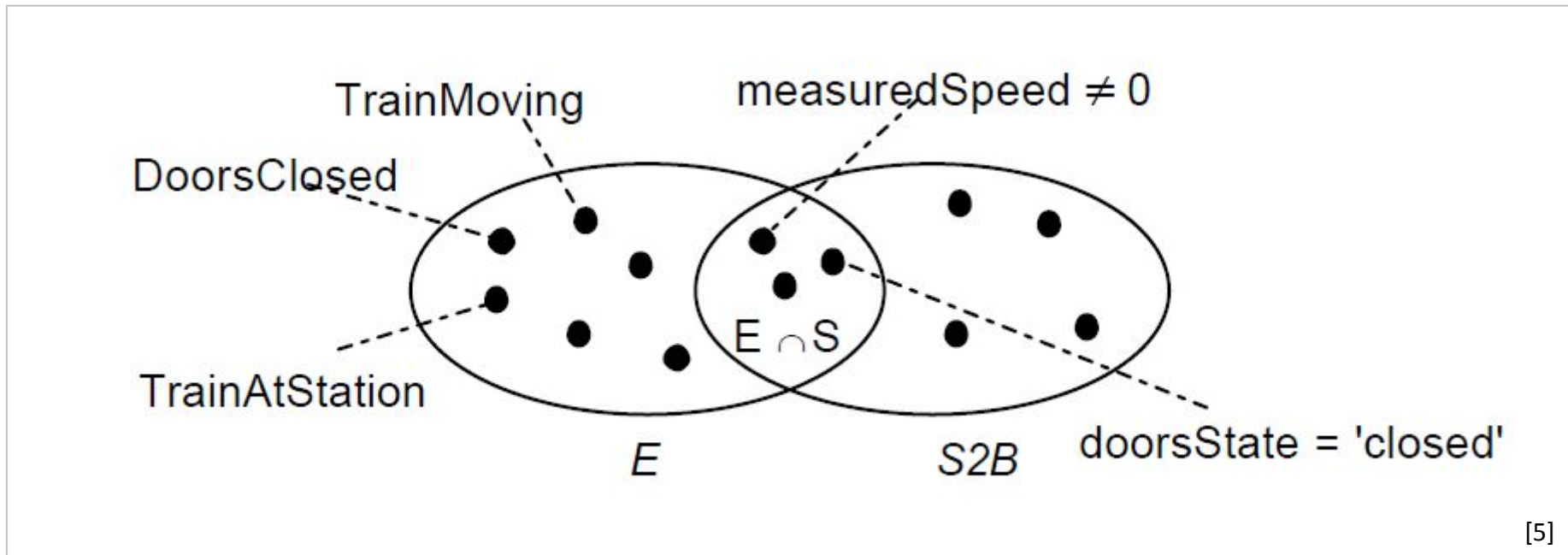
How Can the Requirement Be Satisfied?



- The machine **shares 'specification' phenomena a**
 - MotorOn, SensorOn, DirnUp, ...
- The requirement is **about 'requirement' phenomena b**
 - LiftComes, DoorsOpen, LiftGoesToFloor, ...
 - BookIsLent, MembershipExpires, BookIsLost, ...
 - VehiclesCollide, VehicleWaits, ...
- What connects specification to requirement Phenomena?
 - **Problem World properties**
 - $\text{MotorOn} \wedge \text{DirnUp} \Rightarrow \text{Lift Rising to Next Floor}$
 - Book card is fixed to the book

[7]

Shared Phenomena



Reqs vs Specs

Requirements Engineering... what? (7)

- ◆ Requirements are *prescriptive* assertions formulated in terms of *environment* phenomena (*not necessarily shared*)

TrainMoving $\Rightarrow$ DoorsClosed

- ◆ Software specifications are *prescriptive* assertions formulated in terms of *shared* phenomena

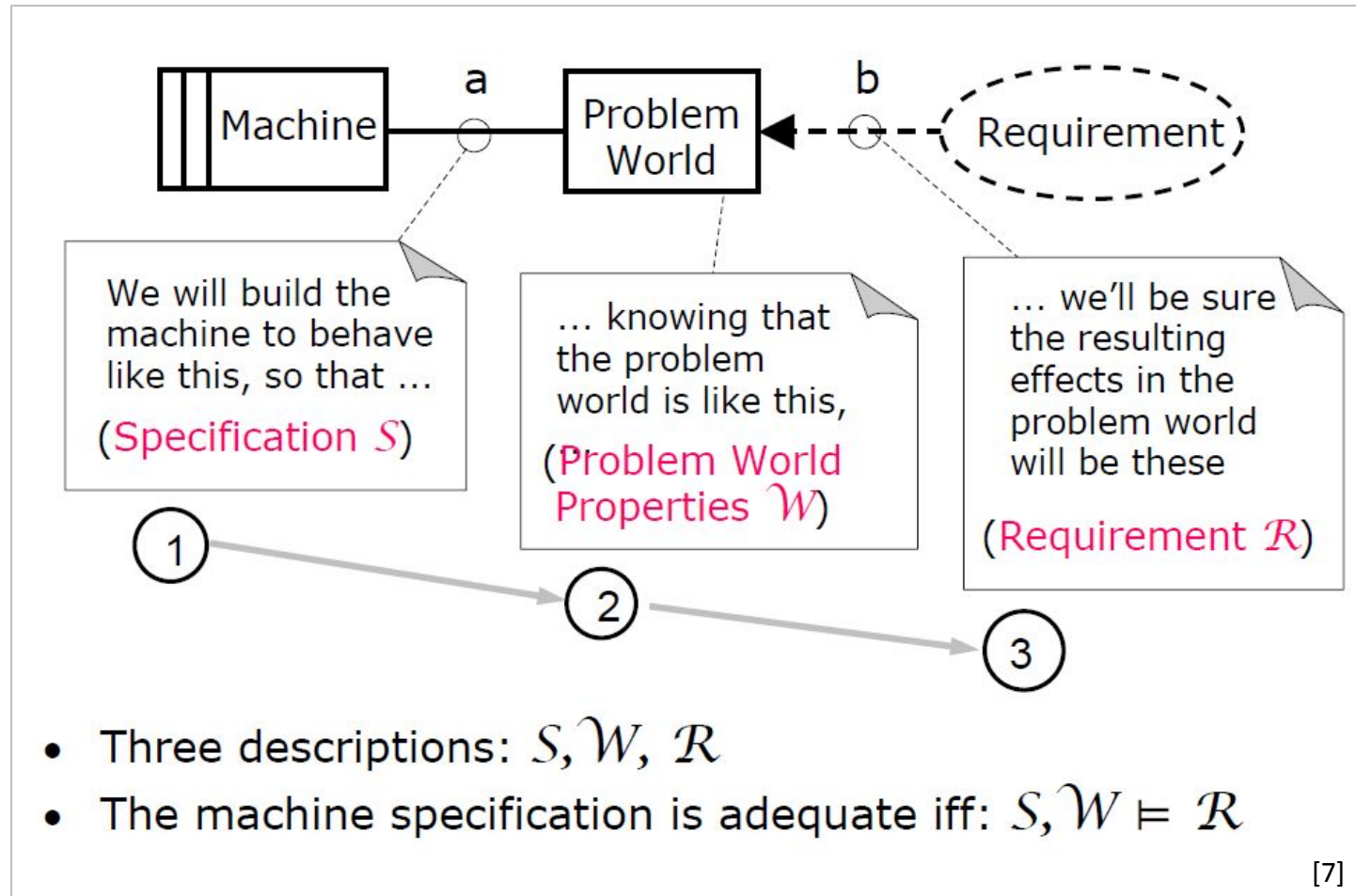
measuredSpeed $\neq 0 \Rightarrow$ doorsState = 'closed'

- ◆ Domain properties are *descriptive* assertions assumed to hold in the domain

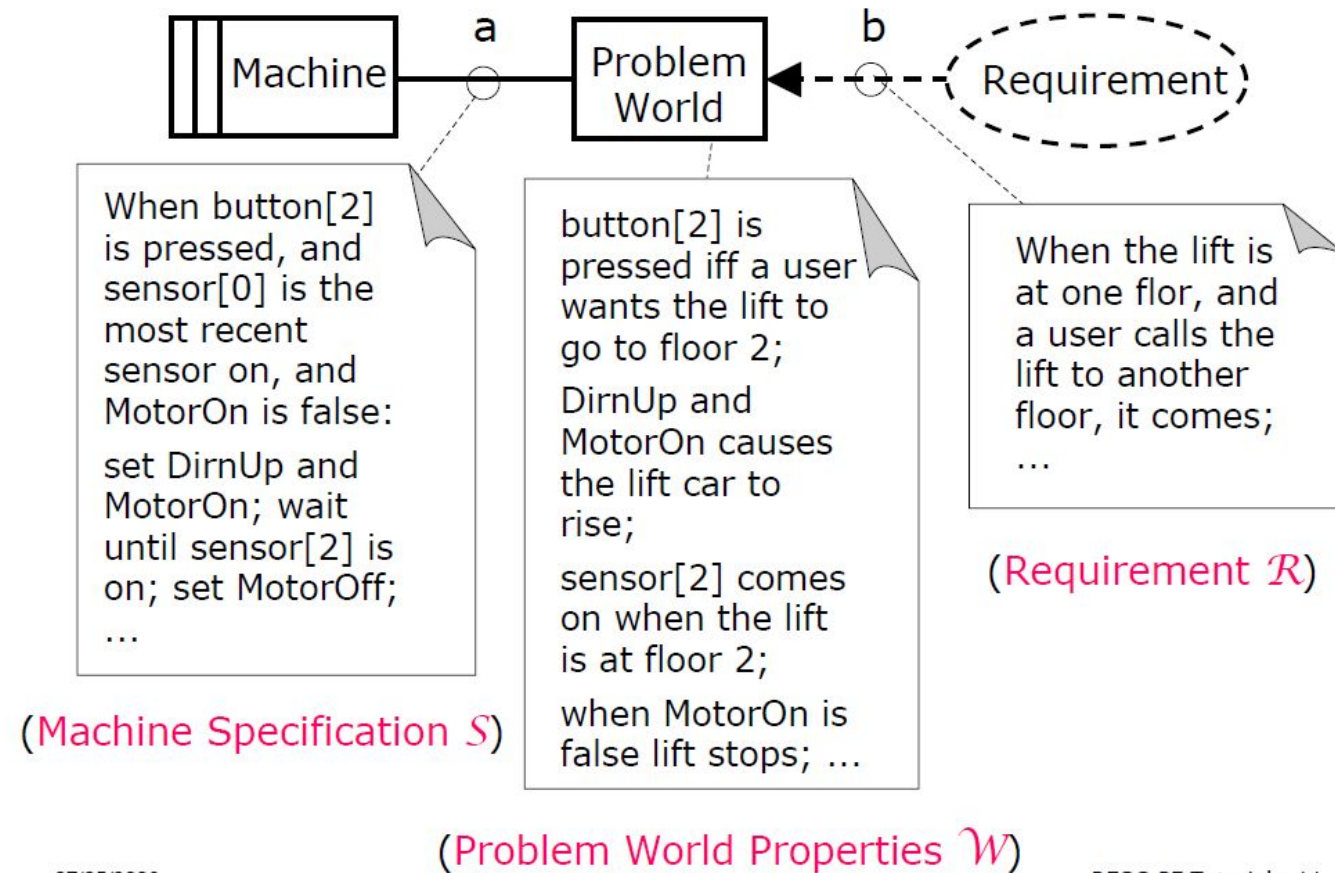
TrainMoving $\Leftrightarrow$ measuredSpeed $\neq 0$

(Jackson, 1995 & Parnas, 1995)

Three Satisfying Descriptions



Example



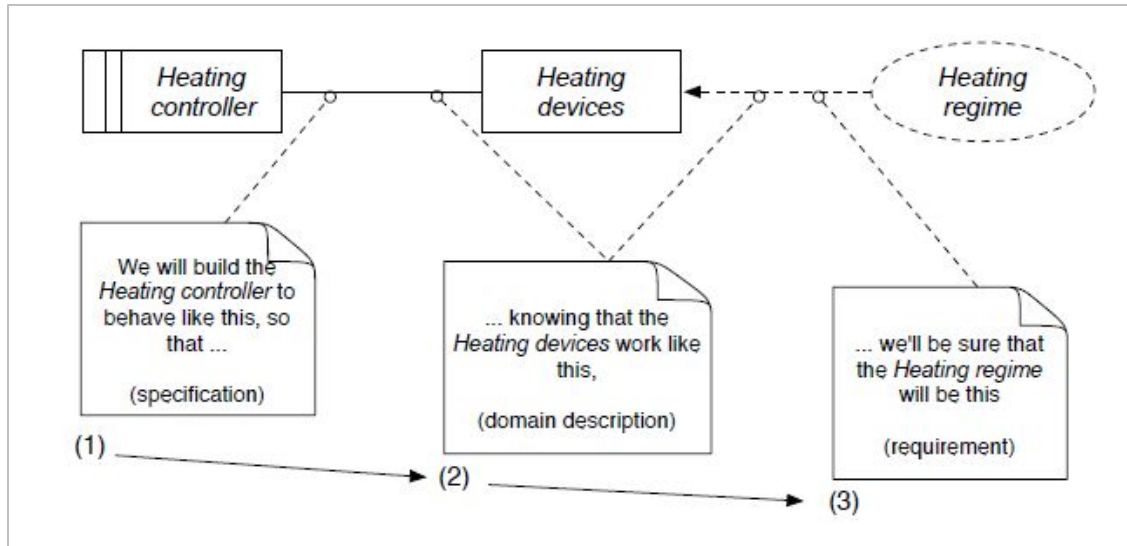
Problem Frame Requirement Definition

- Requirement – optative description of the phenomena in the environment aka Problem World.

or

- Requirements are prescriptive assertions formulated in terms of shared phenomena

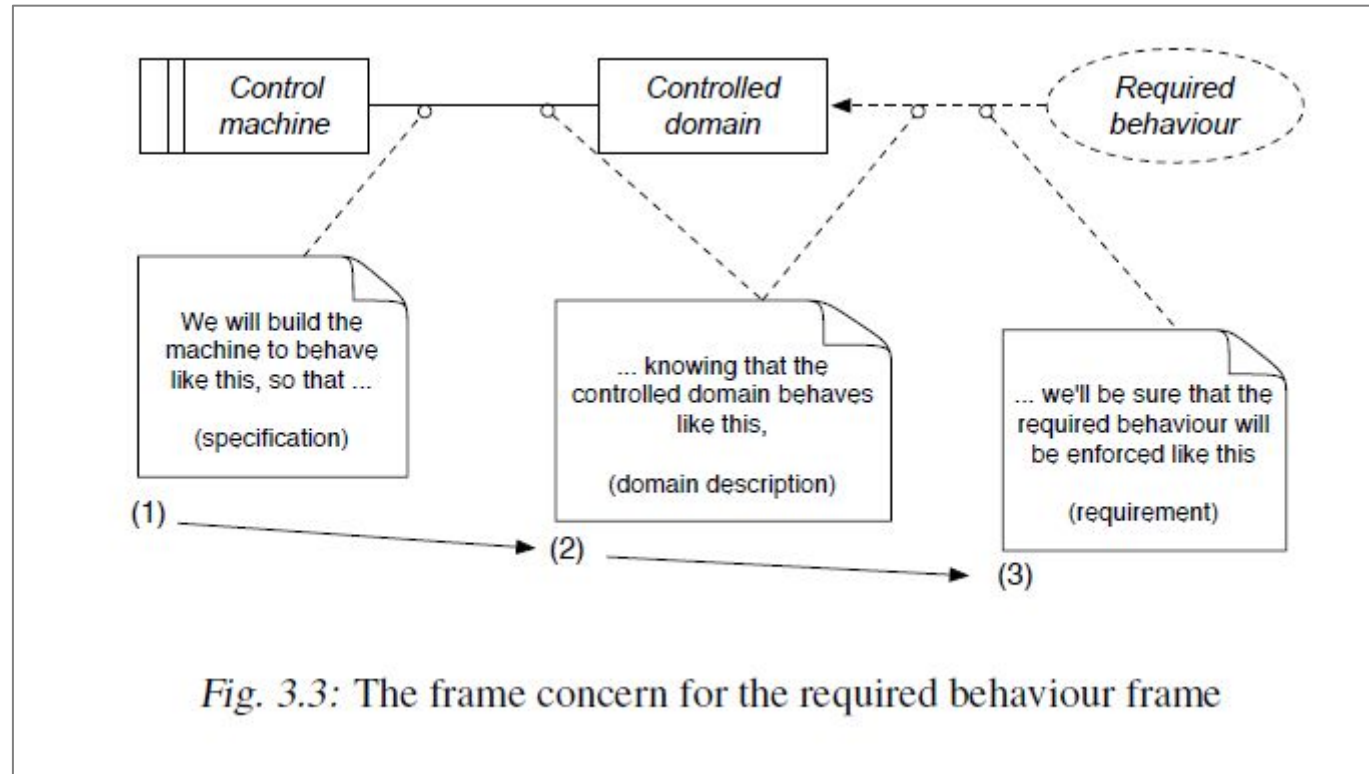
Let's Practice



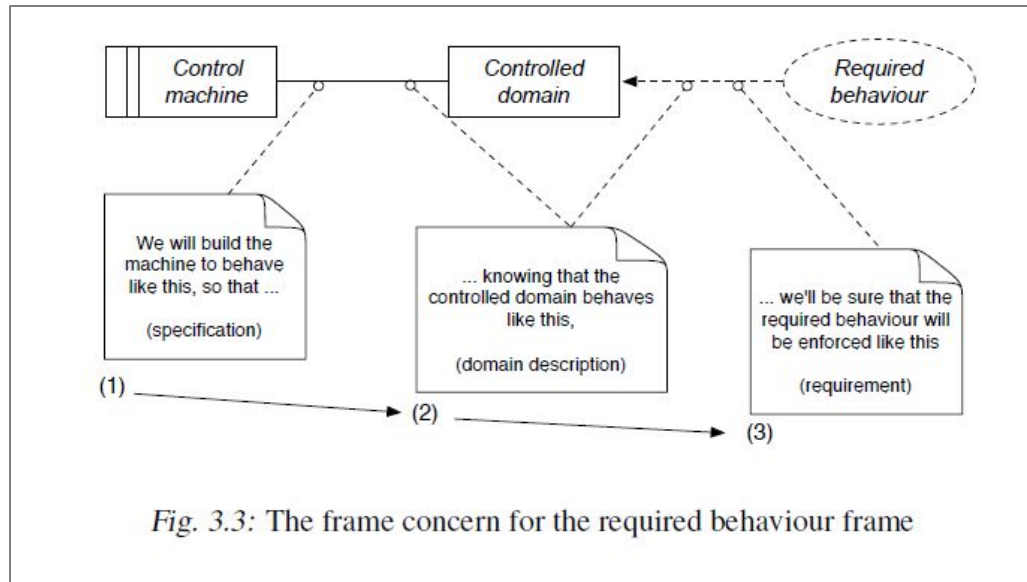
- Describe
 - Requirements (*Heating regime*)
 - Heating device (Problem world – Domain description)
 - Heating controller (Machine - Specification)

BUSINESS REQUIREMENTS FRAMEWORK

Problem Frame Concern



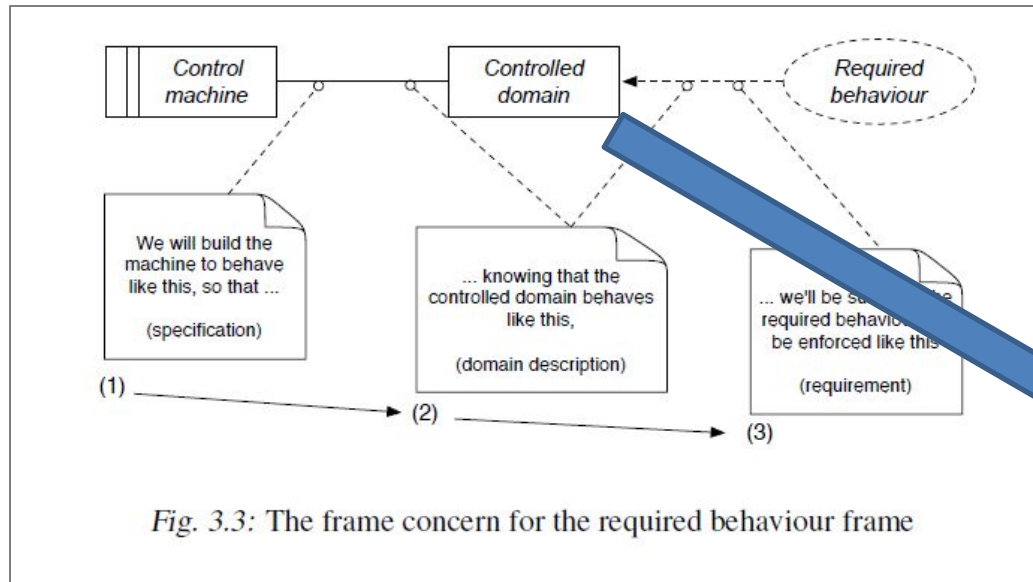
Where Does The User Story Fit?



- Required behavior – User story
- Controlled domain – ?
- Control machine – IT system (SAP, WMS, ...)

What is the Domain of User Story?

The Domain of US is Task (Environment)



PCF LEVELS EXPLAINED

Level 1 - Category

10.0 Manage Enterprise Risk, Compliance, Remediation, and Resiliency (16437)

Represents the highest level of process in the enterprise, such as Manage customer service, Supply chain, Financial organization, and Human resources.

Level 2 - Process Group

10.1 Manage Enterprise Risk (17060)

Indicates the next level of processes and represents a group of processes. Perform after sales repairs, Procurement, Accounts payable, Recruit/source, and Develop sales strategy are examples of process groups.

Level 3 - Process

10.1.4 Manage Business Unit and Function Risk (17061)

A process is the next level of decomposition after a process group. The process may include elements related to variants and rework in addition to the core elements needed to accomplish the process.

Level 4 - Activity

10.1.4.3 Develop Mitigation Plans for Risks (16458)

Indicates key events performed when executing a process. Examples of activities include Receive customer requests, Resolve customer complaints, and Negotiate purchasing contracts.

Level 5 - Task

10.1.4.3.1 Assess Adequacy of Insurance Cover (18129)

Tasks represent the next level of hierarchical decomposition after activities. Tasks are generally much more fine grained and may vary widely across industries. Examples include: Create business case and obtain funding and Design recognition and reward approaches.

What is Required Behavior...

PCF LEVELS EXPLAINED

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- For Category Domain?
- For Process Group Domain?
- For Process Domain?
- For Activity Domain?

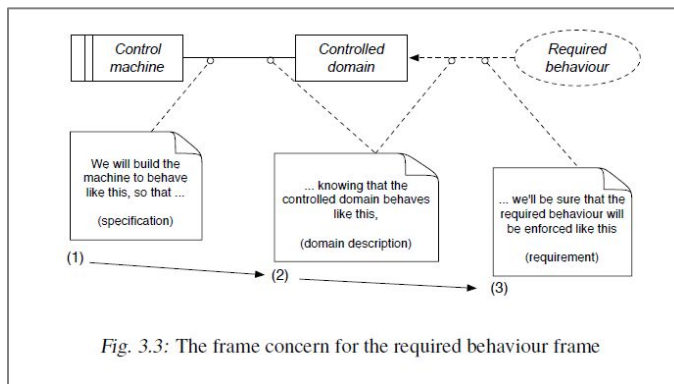
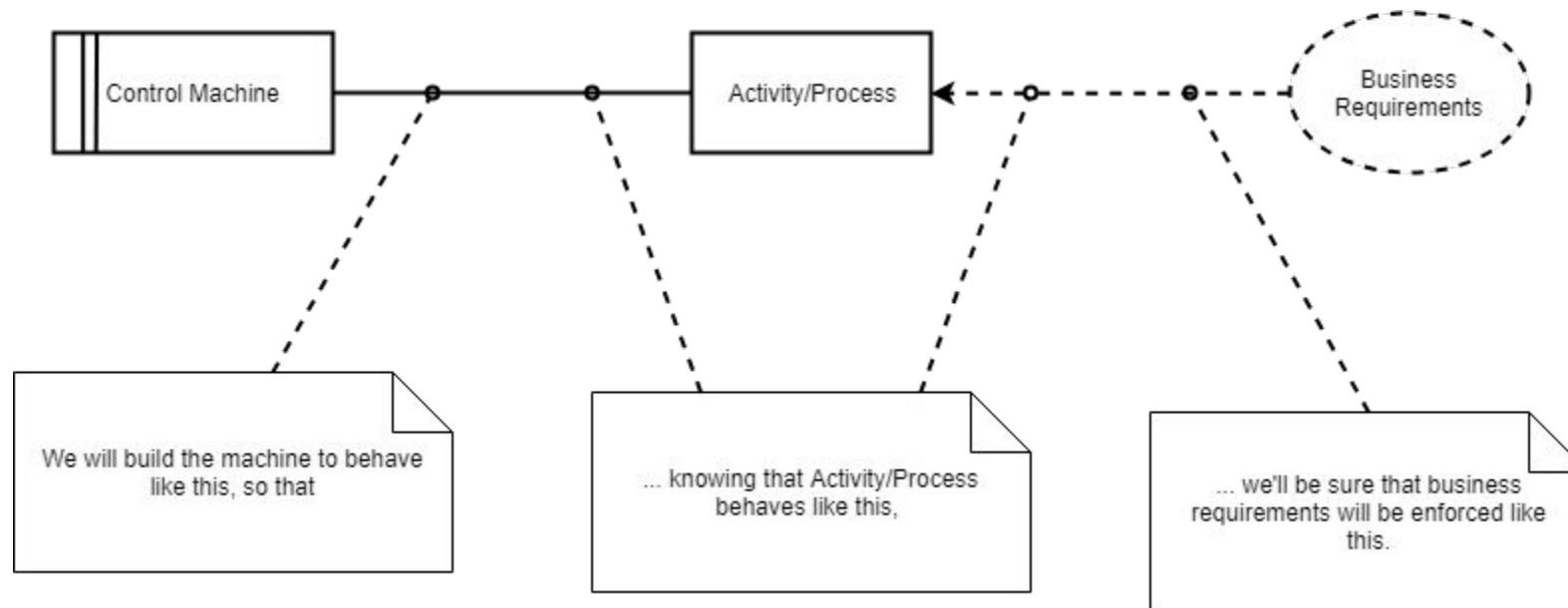


Fig. 3.3: The frame concern for the required behaviour frame

Required Behavior for Process and Activity

- Is Business Requirements!



Business Requirements are ...

- optative descriptions of the business activity or process,
or
- prescriptive assertions formulated in terms of business activity or process.

What are phenomena of business process?

- Process duration
- Percentage of the quality output
- Auditability of calculations
- KPIs!

Process Owner's Story

- As a process owner I want all calculations of promo compensations done in SAP so that my compensation calculations are 100% auditable.
- **Requirement (goal) - compensation calculations are 100% auditable.**
- Specification - all calculations of promo compensations done in SAP.

Requirement Traceability

- Specification of the higher level requirement is the requirement for implementing lower-level requirement
 - Goal model in KAOS

BNM's Story (Epic?)

- As a BNM I want promo agreements with compensation rules registered in the SAP so that all calculations of promo compensations done in SAP.
- **Requirement (goal) – all calculations of promo compensations done in SAP.**
- Specification - promo agreements with compensation rules registered in SAP.

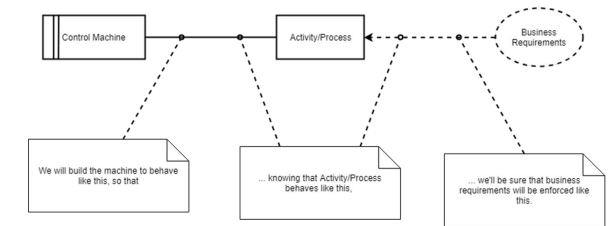
Process Owner => BNM

- As a process owner I want **all calculations of promo compensations done in SAP** so that **my compensation calculations are 100% auditable**.
 - Specification (objective) - **all calculations of promo compensations done in SAP**.
 - Requirement (goal) - **compensation calculations are 100% auditable**.
- As a BNM I want **promo agreements with compensation rules registered in the SAP** so that **all calculations of promo compensations done in SAP**.
 - Specification (objective) - **promo agreements with compensation rules registered in SAP**.
 - Requirement (goal) – **all calculations of promo compensations done in SAP**.

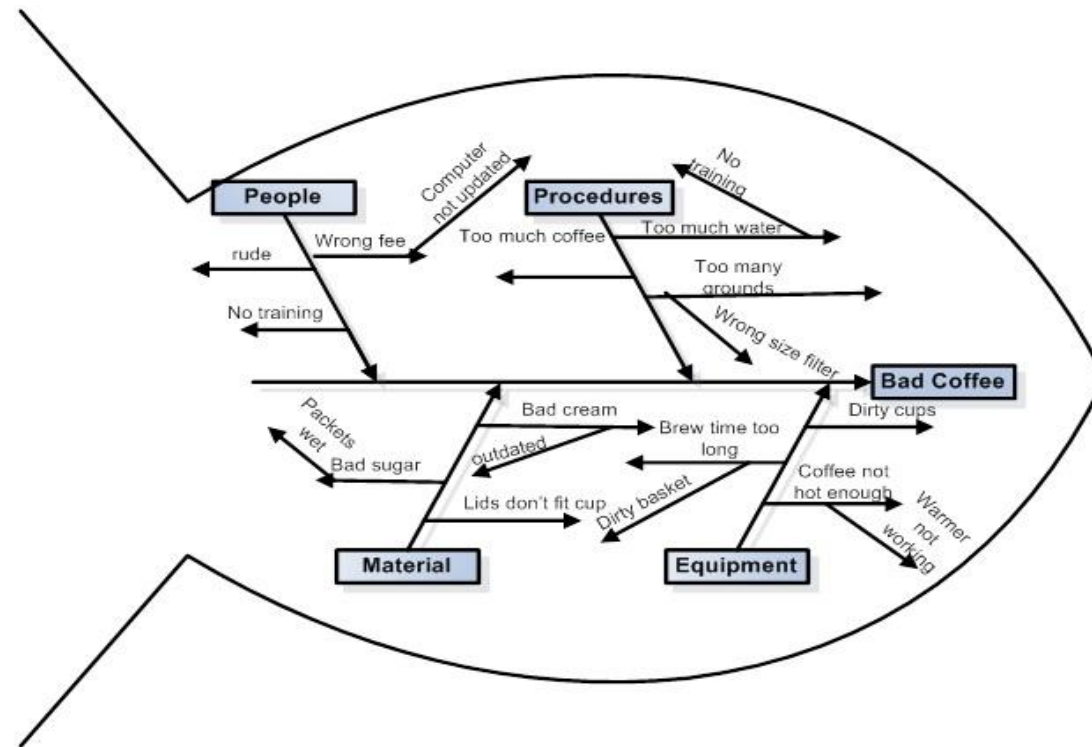
Specification = Implementation of the Requirement

Specification = Implementation of the Requirement

Machine (Controller) will implement Specification.
What is the Machine of the Process?



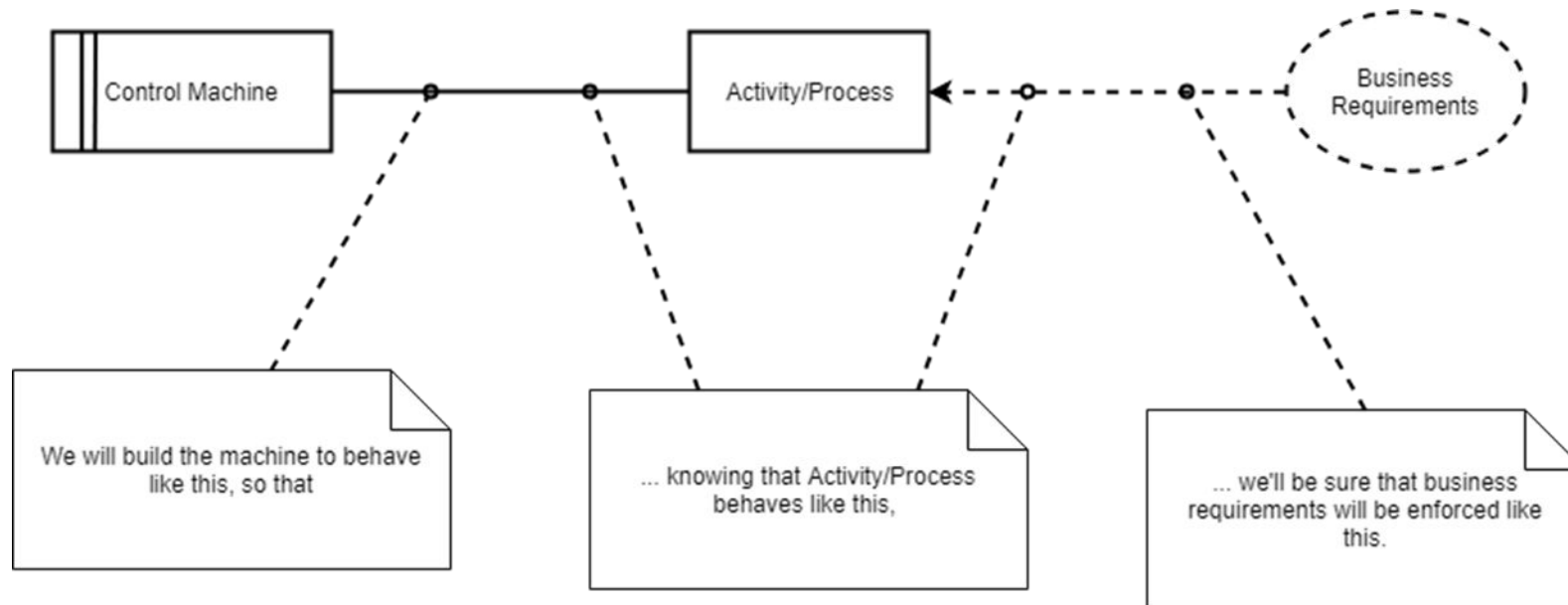
Coffee



Maxima

- To be defined ...
- But specific by the process

Machine, Domain and Requirement



Thank you!

- Can you answer the questions:
 - What business requirements are and what are not?
 - What are the ways to document BRs?

Decision, choose one:

Yes | Yes, but | Not sure | No