
Quality of Models

Requirements Engineering II

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Agenda

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 - c. Types of models
 - d. The multiple view approach
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Motivation

Why do we use Models in Software Engineering?

- Descriptive Element
 - Documentation
 - Formalisation
- Prescriptive Element
 - Instruction
 - Exploration (Prototyping)

> Quality is crucial to meet customer expectations!

Models in Software Engineering

Definition and Criteria

Modulus (lat.) - measure, rule, pattern, example to be followed

In Software Engineering:

Process Models, Design Patterns, Class Diagrams...

Mapping Criterion

There's an *original*, which is mapped to the model.

Reduction Criterion

The model does not contain all details of the original.

Pragmatic Criterion

The model is useful and serves better than the original.

Models in Software Engineering

Types of Models

State-oriented Models

Finite State Machine, StateChart, State-Transition Diagram, Petri Net...

Activity-oriented Models

Data Flow Diagram
Flowchart

Structure-oriented models

Component Diagram
Deployment Diagram

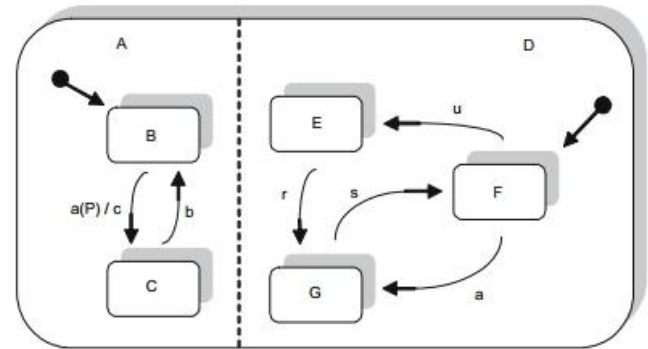


Fig. 3.2 Example of a StateChart

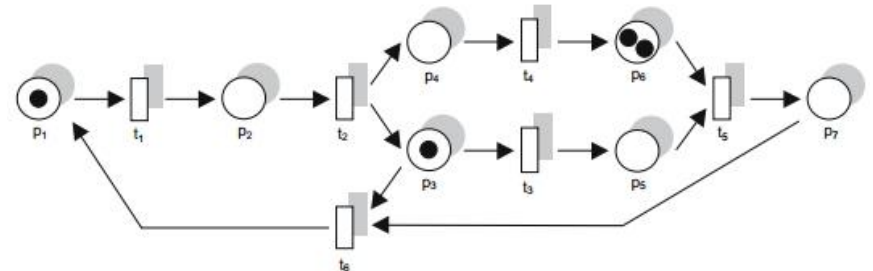


Fig. 3.3 Example of a Petri net

Models in Software Engineering

Types of Models

Data-oriented Models

Class Diagram, Entity-Relationship-diagram, Jackson's structured diagram

Heterogeneous Models

Control-flow diagram

Program State Machine

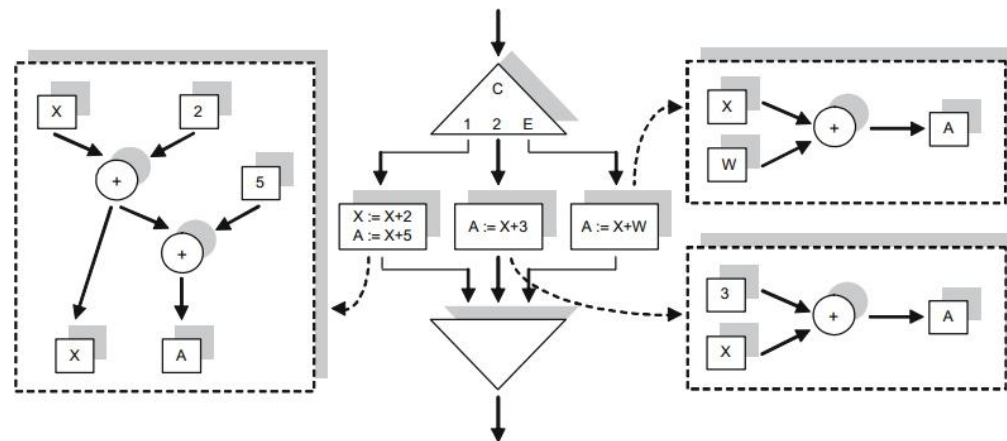


Fig. 3.4 Example of a control/data flow graph

Models in Software Engineering

The Multiple View Approach

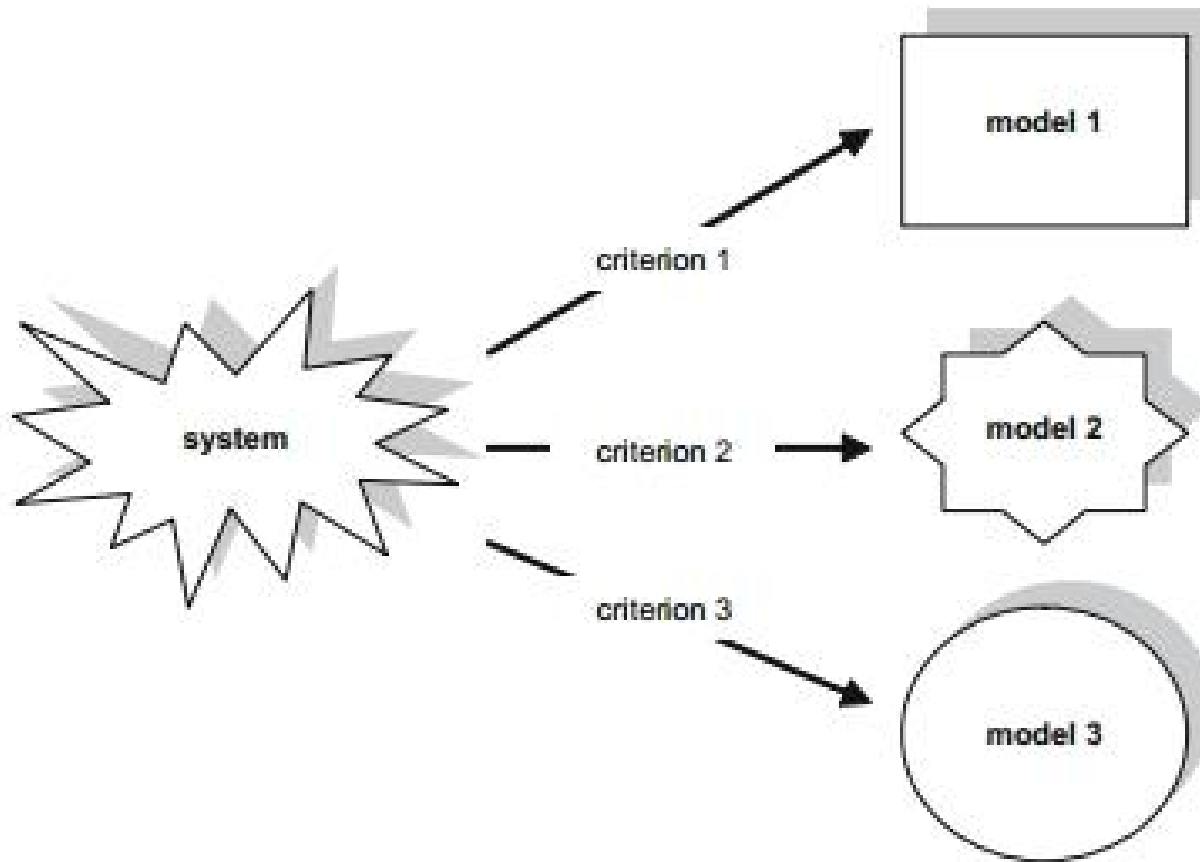


Fig. 3.6 The multiple view approach

Quality of Models

Quality Framework

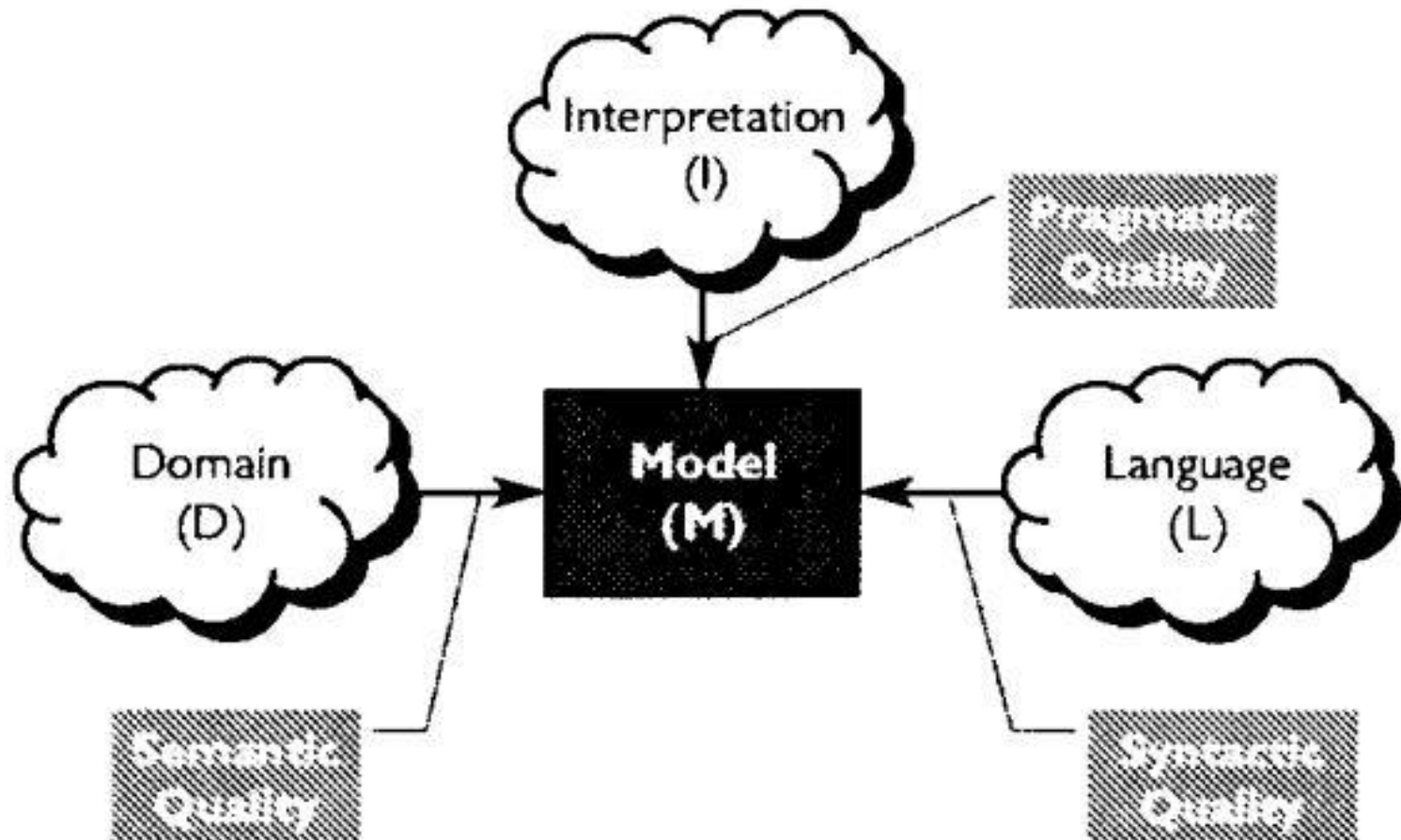


Figure 1. Conceptual Model Quality Framework

Quality of Models

Syntactic Quality

Goals: **Syntactic Correctness**

There are no statements in the model M , which are not part of the modeling language L .

Means: Error Prevention

Error Detection

Error Correction

Quality of Models

Semantic Quality

Goals: **Validity and Completeness**

All relevant statements in Model M are correct and none missing.

Means: Delete Requirements

Add Requirements

Correct Requirements

Quality of Models

Pragmatic Quality

Goals: **Comprehension**

The model has been understood

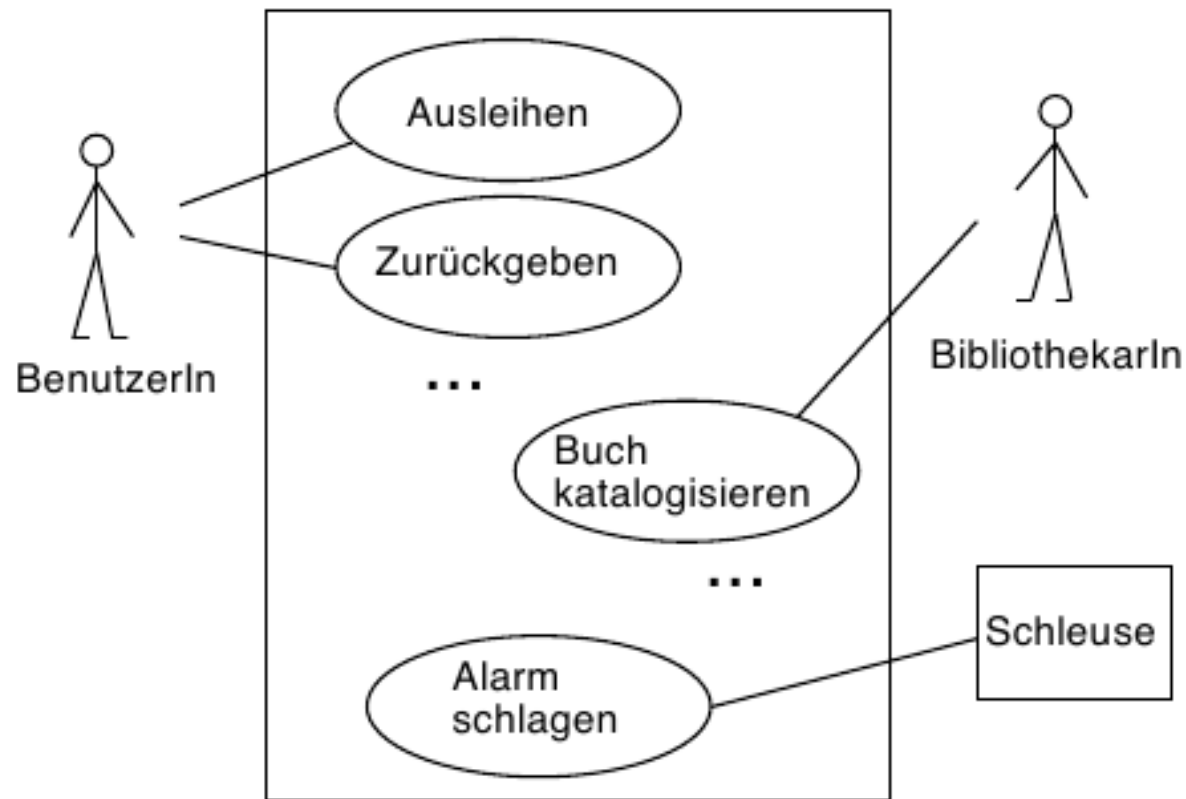
Means: Readability

Simulation

Filtering

Quality of Models

Example



Quality of Models

Evaluation Results

Study

Double-blind test of Quality Framework with 192 Participants.

Strengths

Framework useful

Likelihood of adoption

Weaknesses

Defect detection

Lessons Learned I

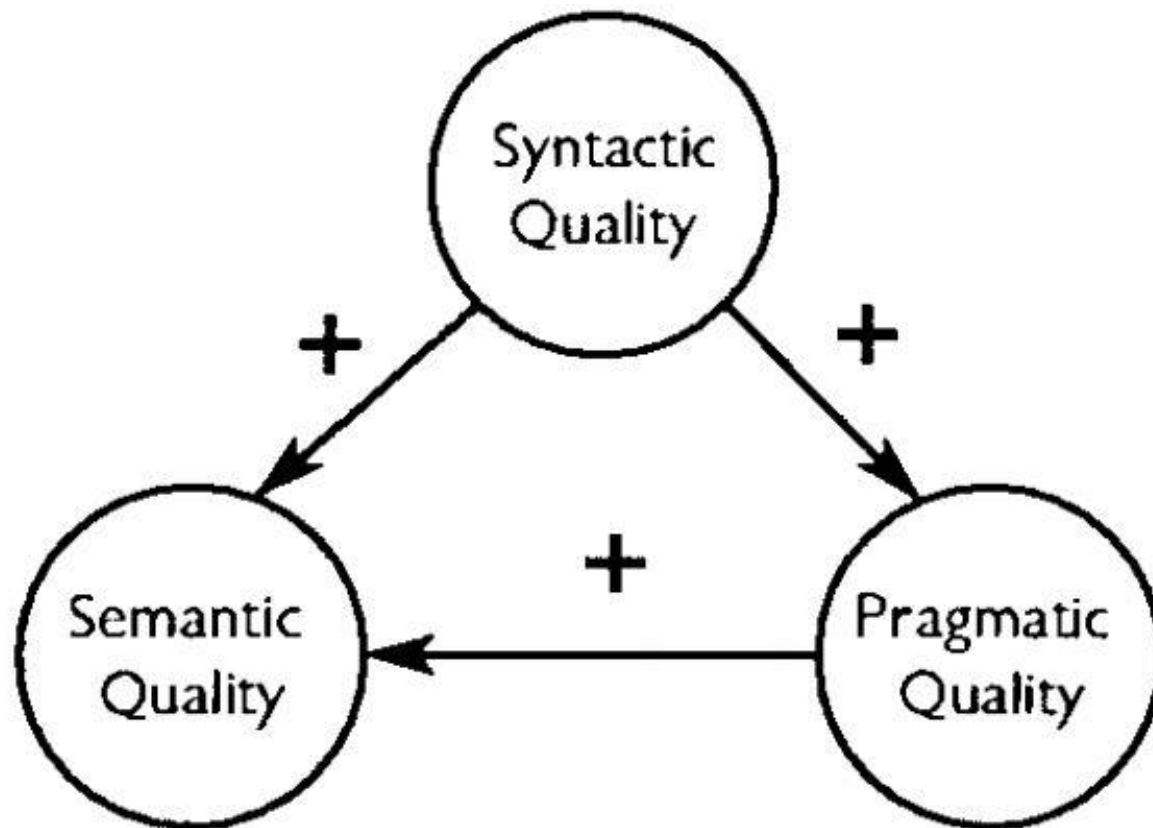


Figure 6. Interactions Between Quality Categories

Lessons Learned II

Models are everywhere,
BUT it's difficult to achieve quality....

So use quality frameworks,
and improve existing models!
