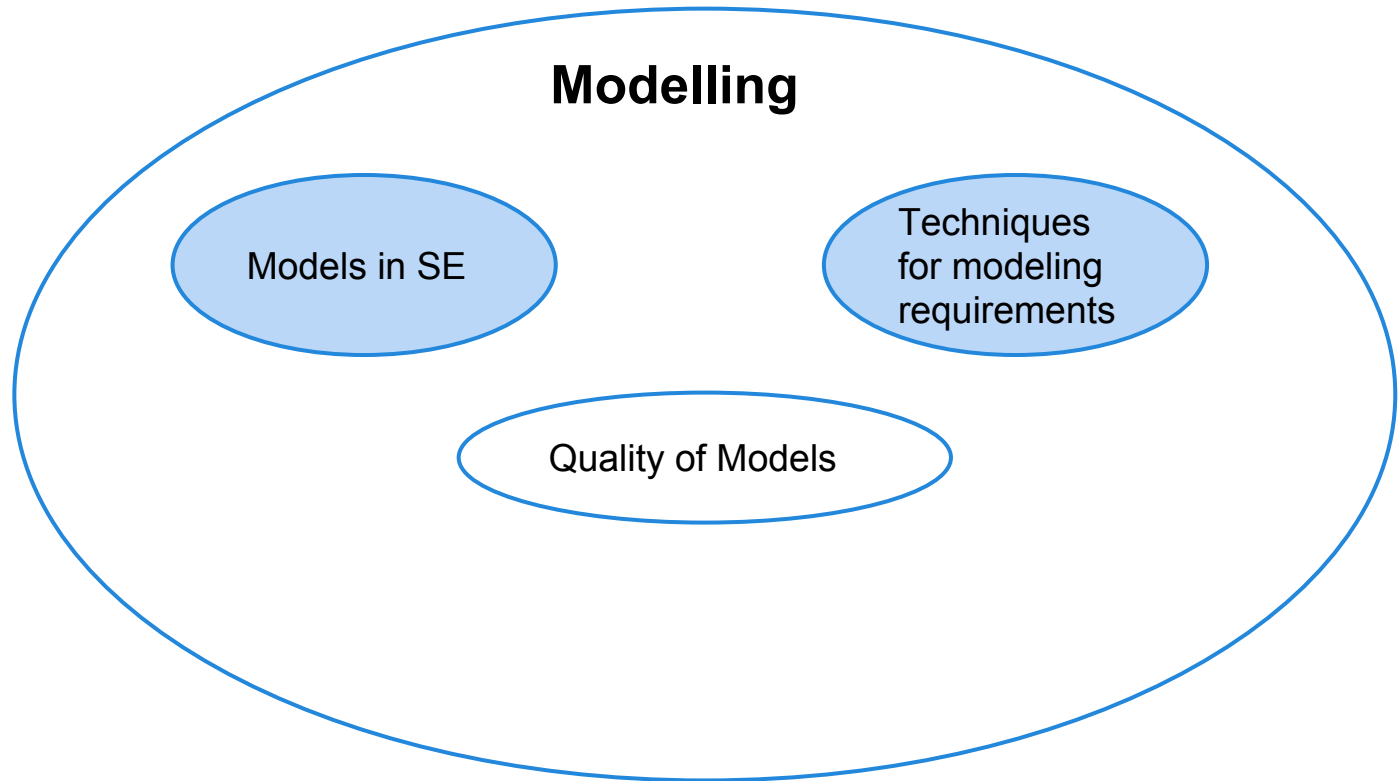


Quality of Models

Samuel Liniger, Fabian Hofstetter, Cristian Anastasiu

Context





Understanding Quality in Conceptual Modeling

ODD IVAR LINDLAND, GUTTORM SINDRE, and
ARNE SÖLVBORG, University of Trondheim, NTH

◆ With the increasing focus on early development as a major factor in determining overall quality, many researchers are trying to define what makes a good conceptual model. However, existing frameworks often do little more than list desirable properties. The authors examine attempts to define quality as it relates to conceptual models and propose their own framework, which includes a systematic approach to identifying quality-improvement goals and the means to achieve them.

Most developers are recognizing that the quality of the end product depends greatly on the accuracy of the requirements specification and are concentrating more on improving the early stages of development.

A conceptual model — any collection of specification statements relevant to some problem — is an important part of early development. Within the scope of conceptual modeling is the requirements specification, as well as any additional knowledge not in the form of requirements.

Much has been written about the quality of conceptual models and how to achieve it through the use of frameworks that classify quality goals. Unfortunately, these frameworks for the most part merely list properties, without giving a systematic structure for evaluating them. We

propose a framework that not only identifies major quality goals, but gives the means for achieving them.

Our framework has two unique features:

- ◆ It distinguishes between goals and means by separating what you are trying to achieve in conceptual modeling from how to achieve it. We have made the goals more realistic by introducing the notion of feasibility.
- ◆ It is closely linked to linguistic concepts because we recognize that modeling is essentially making statements in some language.

EXISTING FRAMEWORKS

The box at right gives some useful model properties we compiled from frameworks by David Kung,¹ Graia-Catalin Roman,² Raymond Voh,³ and Alan

Evaluating the Quality of Information Models: Empirical Testing of a Conceptual Model Quality Framework

Daniel L. Moody^{1,2}
Guttorm Sindre³
Terje Brustadvik³
Arne Sølvberg³

¹Department of Software Engineering, Charles University, Prague, Czech Republic

²School of Business Systems, Monash University, Melbourne, Australia

³Department of Computer and Information Science, Norwegian University of Science and Technology, Trondheim, Norway

⁴Department of Management Science and Information Systems, University of Auckland, New Zealand
email: dmoody@infotech.monash.edu.au; [gutters, brase, avolvberg]@idi.ntnu.no

Abstract

This paper conducts an empirical analysis of a semiotics-based quality framework for quality assuring information models. 192 participants were trained in the concepts of the quality framework, and used it to evaluate models represented in an extended Entity Relationship (ER) language. A randomised, double-blind design was used, in which each participant independently reviewed multiple models and each model was evaluated by multiple reviewers. A combination of quantitative and qualitative analysis techniques were used to evaluate the results, including reliability analysis, validity analysis, interaction analysis, influence analysis, defect pattern analysis and task accuracy analysis. An analysis was also conducted of the framework's likelihood of adoption in practice. The study provides strong support for the validity of the framework and suggests that it is likely to be adopted in practice, but raises questions about its reliability and the ability of participants to use it to accurately identify defects. The research findings provide clear directions for improvement of the framework. The research methodology used provides a general approach to empirical validation of quality frameworks.

1. INTRODUCTION

1.1 The Importance of Conceptual Model Quality

The traditional thrust of software quality assurance has been to use "brute force" testing at the end of the development process [56]. However empirical studies show that more than half the errors which occur during systems development are the result of inaccurate or incomplete requirements [30, 34]. Requirements errors are also the most common cause of failure in systems development projects [54, 55].

This suggests that substantially more effort should be spent to quality assure conceptual models, in order to catch requirements defects as soon as they occur, or to prevent them from occurring altogether [64]. Empirical studies have shown that moving quality assurance effort up to the early phases of development can be 33 times more cost effective than testing done at the end of development [58]. However, it is during requirements analysis that the notion of software development as a craft rather than an engineering discipline is strongest, and quality is therefore most difficult to assess. There are few guidelines for evaluating the quality of conceptual models, and little agreement even among experts as to what makes a "good" model. As a result, the quality of conceptual models in practice is almost entirely dependent on the competence of the analyst [28, 35].

Lindland 1994

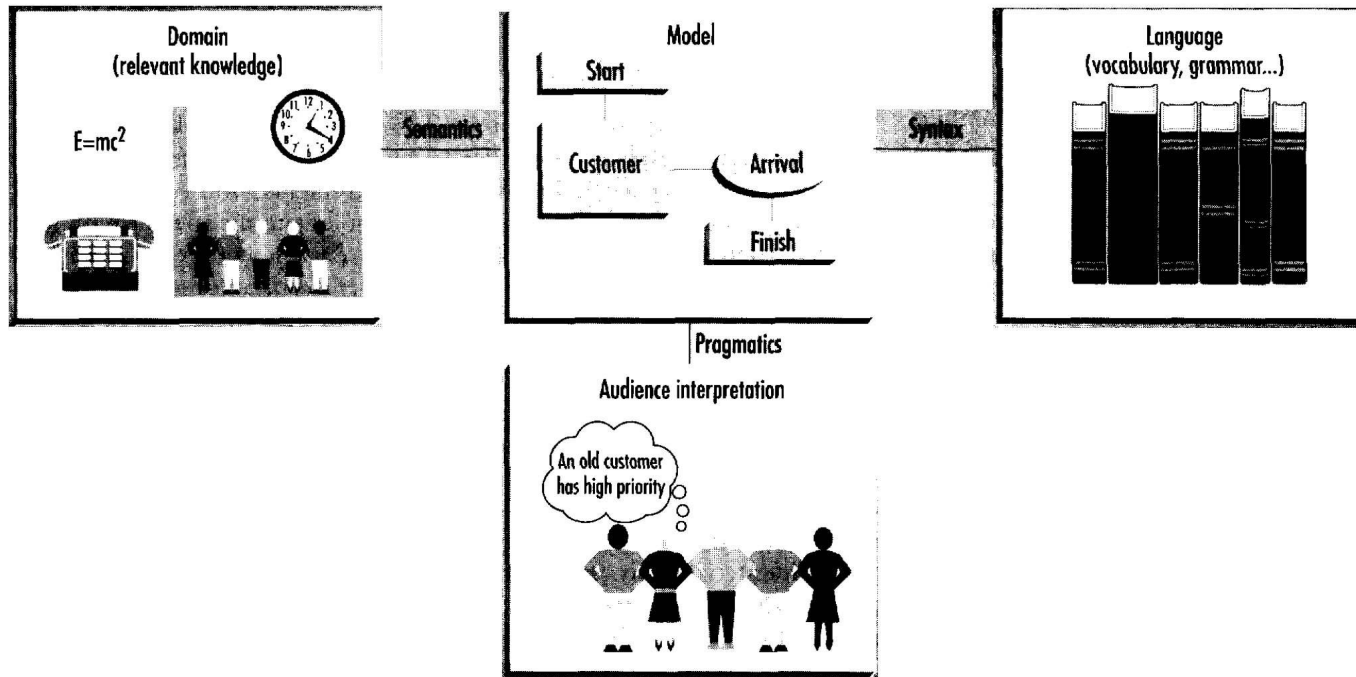
Understanding Quality in
Conceptual Modeling

Moody 2003

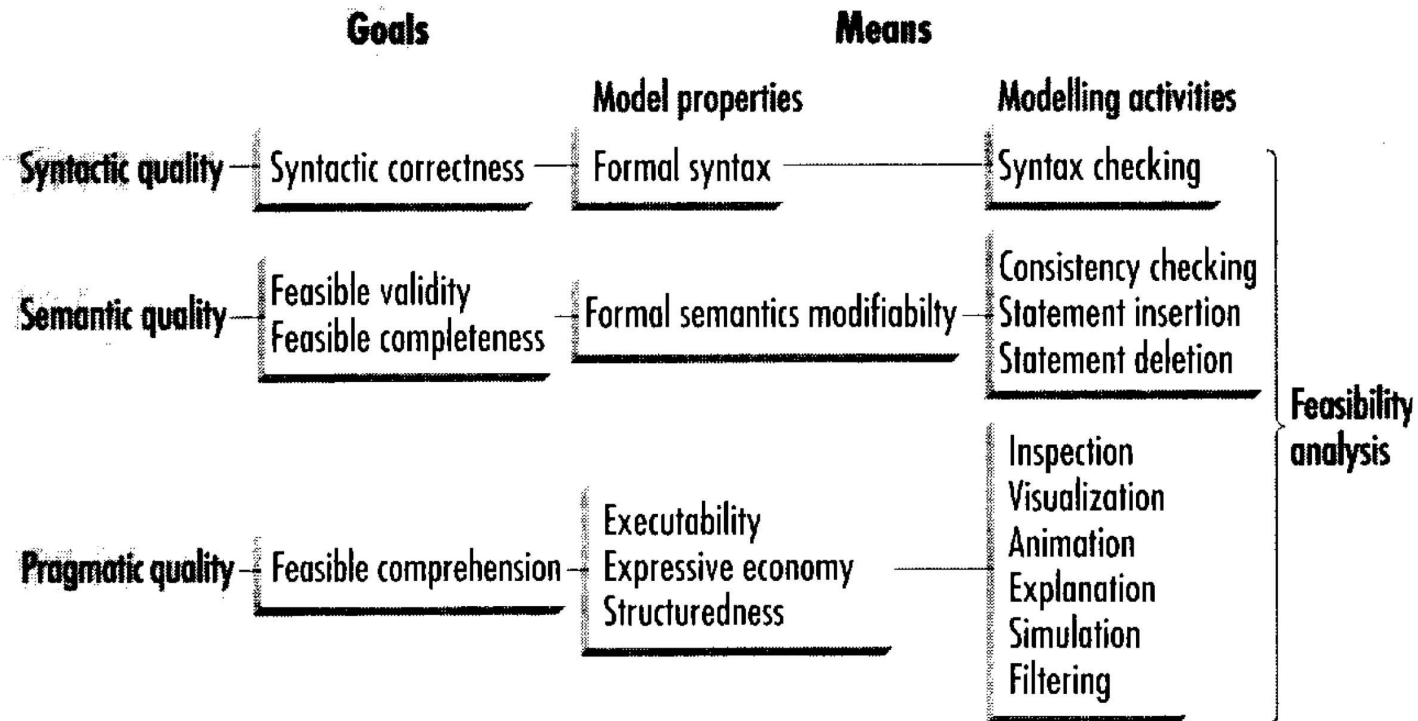
Evaluating the Quality of Information Models:
Empirical Testing of a Conceptual Model Quality
Framework

- Conceptual Model
 - Any collection of specification statements relevant to some problem
- Framework
 - quality of conceptual modelling process
 - quality model
- Factors that affects models quality

Lindland 1994 Understanding Quality in Conceptual Modelling



Lindland 1994 Understanding Quality in Conceptual Modelling



Moody 2003 Evaluating the Quality of Information Models

- Empirical analysis of quality framework of Lindland
- Research questions
 - Does the framework provide a reliable and valid basis for evaluating the quality of information models?
 - Is the framework likely adopted in practice?

Optional

Moody 2005

Theoretical and practical issues in evaluation the quality of conceptual models: current state and future directions

- review of research
- theoretical and practical issues

Discussion