

Smart Modeling for softw@re Research and Technology

CNRS IRIT Lab, Toulouse, France

- https://www.irit.fr/smart
- **☑ ②**SmartModelTeam
 - https://github.com/smart-researchteam





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- **Formal** Requirements

- Requirements **relationships**
- Formal requirements **Survey**
- **PEGS**: Formal 00 Requirements approach



The role of formalism in system requirements

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The review discusses a number of open questions, including seattlessness, the role of tools and ed and how to make infustrial applications benefit more from the contributions of formal approaches.

Meyer, 2021. The role of formalism in 35 pages, https://doi.org/10.1145/3446 1 INTRODUCTION

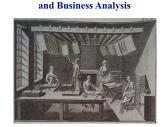
In a world where software pervalues every aspect of our lives, a core issue for the IT industry is how to guarantee in quality of the system in produces. Software quality is a complete and widely statled topic, but it is not hard to provide a simple definition equality means that the affrower dester quit fulley, and does from right. These "things that a software system does are insonen as interior than the state of the footh pask slowing the right things and doing things right, are dependent on the quality of the requirements the requirements must define the system to that a "Rel statify our needs; and

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ACM Comput. Surv., Vol. 1, No. 1, Article 1, Publication date: January 202

Handbook of Requirements



Bertrand Meyer
Shaffhausen Institute of Technology

Version: 2021-05-20 Drug, slo not circulate Change log is on next page

SM@RT



SM@RT

- Specification Drivers
 - Eiffel Requirements Patterns



- **RSML**: Requirements Specific Modeling Language
 - DSL for requirements (https://gitlab.com/Ynigvi/RSML)







- Disjoins (X || Y)
- Belongs $(X \subseteq Y)$
- Repeats $(X \Leftrightarrow Y)$
- Contradicts $(x \oplus Y)$

- Extends (x > Y)
- Excepts (X \\ Y)
- Constraints (x y)
- Characterizes (x → Y)

Formal requirements **survey**

4 years

8 reviewers

85p. answers



The role of formalism in system requirements

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A major determinant of the quality of software systems is the quality of their requirements, which should be both understandable and precise. Most requirements are written in natural language, good for understandability but lacking in precision.

To make requirements precise, researchers have for years advocated the use of mathematics-based notations and methods, known as "formal". Many exist, differing in their style, scope and applicability. The present survey discusses some of the main formal approaches and compares them to informal methods.

The analysis uses a set of 9 complementary criteria, such as level of abstraction, tool availability, traceability support. It classifies the approaches into five categories based on their principal style for specifying require ments: natural-language, semi-formal, automata/graph, mathematical, seamless (programming-language

based). It includes examples from all of these categories, altogether 21 different approaches, including for example SysML Relax Eiffel Event-B Alloy. The review discusses a number of open questions, including seamlessness, the role of tools and education and how to make industrial applications benefit more from the contributions of formal approaches.

Jean-Michel Bruel, Sophie Ebersold, Florian Galinier, Manuel Mazzara, Alexandr Naumchev, and Bertrand Meyer. 2021. The role of formalism in system requirements. ACM Comput. Surv. 1, 1, Article 1 (January 2021), 35 pages, https://doi.org/10.1145/3448975

1 INTRODUCTION

In a world where software pervades every aspect of our lives, a core issue for the IT industry is how to guarantee the quality of the systems it produces. Software quality is a complex and widely studied topic, but it is not hard to provide a simple definition: quality means that the software does the right things, and does them right. These "things" that a software system does are known as its requirements. Not surprisingly, requirements engineering is a core area of software engineering.

Both goals, doing the right things and doing things right, are dependent on the quality of the requirements: the requirements must define the system so that it will satisfy user needs; and they must make it possible to assess a candidate implementation against this definition, a task

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0360-0300/2021/1-ART1 \$15.00

https://doi.org/10.1145/3448975

ACM Comput. Surv., Vol. 1, No. 1, Article 1. Publication date: January 2021





PEGS: Formal OO Requirements approach

Bertrand Meyer upcoming book!



SM@RT

- Tech. Transfer
- RSML Industrialisation



Strattics at Chicago

RE activities

- **Formal** Requirements => 2 PhDs + 1 Start-up
- Requirements **relationships** => A taxonomy of relationships
- Formal requirements **Survey** => Published in **ACM Surveys**
- **PEGS**: Formal 00 Requirements approach => A **book** in 2021







- \$\$ => hard to get projects/fundings
- Small community => Collaboration
- Open data => shared repo of requirements?