Quality management using model-driven engineering: an overview.

I. Ruiz-Rube and M.J. Escalona

Abstract Quality Management (QM) is one of the critical points of any software development process. In recent years, several proposals have emerged on this issue, mainly with regard to maturity models, quality standards and best practices collections. Besides, Model Driven Engineering (MDE) aims to build software systems through the construction and transformation of models. However, MDE might be used for other different tasks. In this poster, we summarize the main contributions about the application of MDE to QM activities. The reviewed papers are classified according to a set of practices known relating to assuring, reviewing, monitoring and improving of the software process. We believe that the application of MDE to QM is an area to maximize, because although there are numerous references regarding to MDE and QM, the volume of studies about joint applications is low.

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Technical Reviews

MDE is presented as a great opportunity to improve the quickness and effectiveness of technical reviews. Using several techniques, you can check the quality and adequacy of the models regarding to the proper metamodels and verify compliance of certain organization standards in your designs.

Guidelines Rules: OCL queries

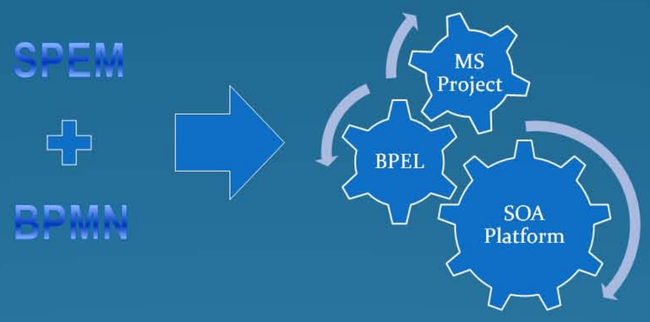
Metamodel alignment

Model checking & Anti-patterns recognition

Sources:
Farkas, T.: Quality Improvement in Automotive Software Engineering Using a Model-Based Approach. (2008)
Escalona, et al. Measuring the quality of Model-Driven projects with NDT-Quality (2010)
Koehler, et al.: Combining quality assurance and model transformations in business-driven development (2007)

Project Management

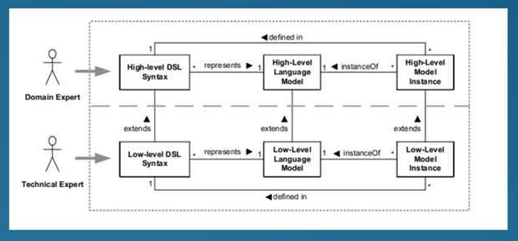
MDE can provide a greater degree of automation in project management tasks by taking advantage of the opportunities to model the development process itself. However, software process metamodels (like SPEM) are not as widespread as UML.



Source:
Aldazabal, et al. : Automated Model Driven Development Processes (2008)

Quality of Service (QoS) mechanisms

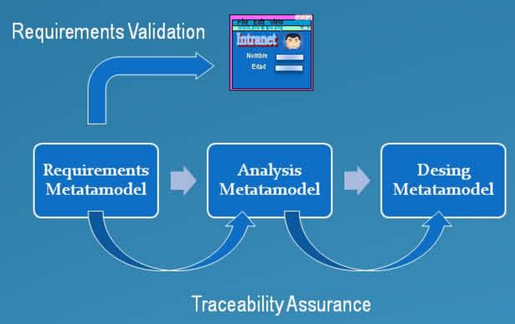
The automation of the start-up and execution of mechanisms for assessment and measurement of QoS can also be carried by the MDE approach. However, the application of MDE in QoS mechanisms is subject to proper growth of QoS assurance techniques that currently not very established.



Source:
Tailoring a model-driven Quality-of-Service DSL for various stakeholders (2009)

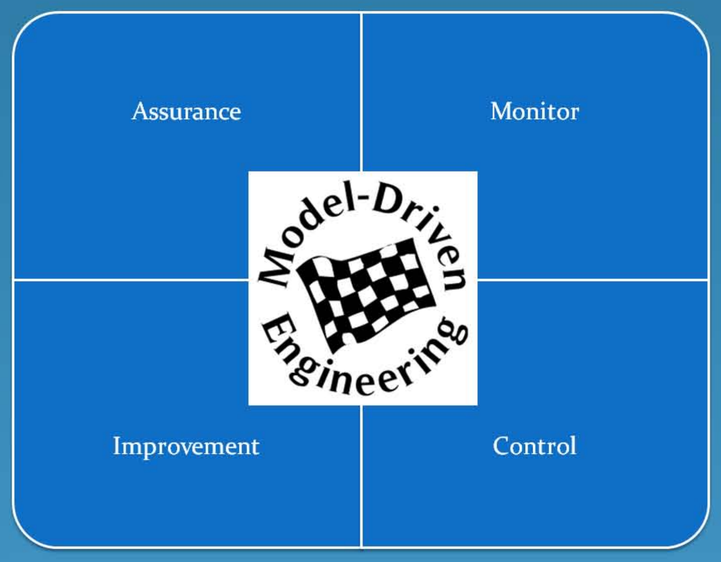
Requirements Management and Validation

Developing the requirements as models, typical practices are improved such as monitoring traceability to identify consistencies between requirements, plans and work products, and validating user requirements through automatically generated navigable prototypes.



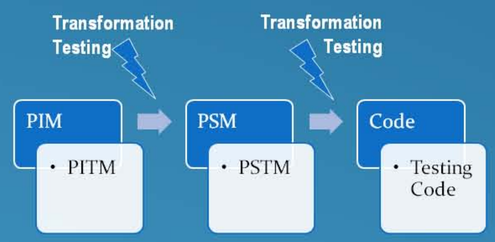
Sources:
Escalona, et al. : Measuring the quality of Model-Driven projects with NDT-Quality (2010)
Escalona, et al. : Developing automatically prototypes with NDT-Prototypes (To Be Appeared)

QUALITY MANAGEMENT



Software Testing

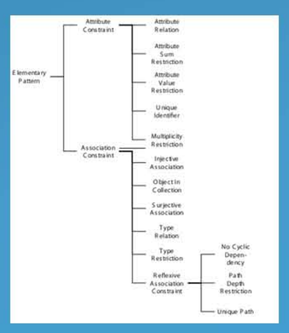
Software testing is one of the traditional practices in Software Engineering. MDE can assist in the definition of test cases by transformations between the engineering models (requirements, analysis, design and code) and test models. Moreover, the model transformation process itself is subject to testing.

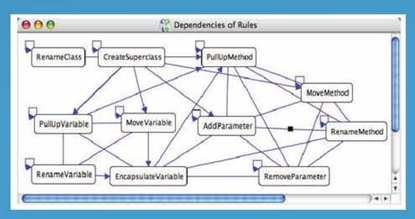


Sources:
Lamancha, et al.: Model-driven testing in software product lines (2009)
Lin, et al.: A testing framework for model transformations (2005)

Quality Improvement

The use of models will help to improve the quality of our designs by automatically applying modeling patterns and software refactoring techniques.





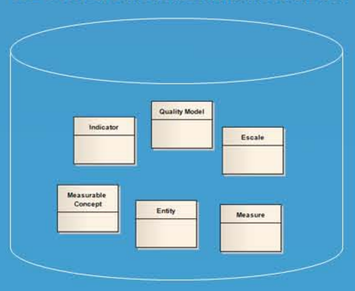
Sources:
Wahler, M.: A Pattern Approach to Increasing the Maturity Level of Class Models (2008)
Mens, T. et al.: Model-Driven Software Refactoring (2008)

Measurement and Analysis

The measurement and subsequent data analysis, it's very important for continuous improvement of organizations, because they can detect areas for improvement. MDE can enhance the definition and compilation of indicators, using models for measuring and data warehouses.

Quality Framework

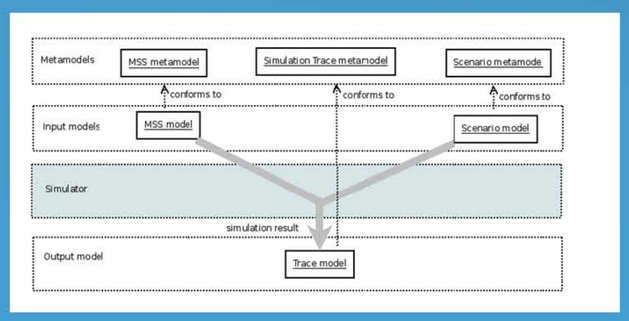
WE Software Measurement Meta-Model



Sources:
Mohagheghi, et al.: Developing a quality framework for model-driven engineering (2008)
Cachero, et al.: Metamodeling the quality of the web development process intermediate artifacts (2007).

Simulation

Simulation in software engineering is a practice that has received significant attention in the academic field, although not in the industry. One of the most important problems in the software simulation is the definition of simulation models themselves. MDE can solve this issue, by the transformation of engineering models in simulation models.



Source:
Monperrus, et al. : Model-driven simulation of a maritime surveillance system (2008)

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