# MoDeVVa Workshop Summary

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The MoDeVVa workshop series is focused on model-driven engineering, verification, and validation.

Models are purposeful abstractions. They are used as a means to abstract unnecessary artifacts and to make complex systems easy to understand. Beyond their use as documentations, models can also be used for transformation or code generation. A formal foundation of models with fixed semantics is necessary for the automatic processing of models. One application is the automatic generation of large parts of systems. This automation can result in a decrease of system engineering costs. Thus, the usage of models, model transformations, and code generation is becoming more and more important for industrial applications. As one of the most important representatives for the application of models, Model-Driven Engineering (MDE) is a development methodology that is based on models, meta models, and model transformations. There is already a lot of tool support for models, (domain-specific) modeling languages, model transformations, and code generation. The constant pace at which scientific and industrial development of MDE-related techniques moves forward shows that MDE is quickly changing and that new approaches and corresponding issues arise frequently. Most important, there is crucial need for verification and validation (V&V) techniques in the context of MDE. Likewise, V&V is very important in many domains (e.g. automotive or avionics) and the use of MDE techniques in the context of V&V is an interesting topic. One prominent representative of this approach is model-based testing.

The objective of the workshop on model-driven engineering, verification and validation (MoDeVVa) in 2009 was to offer a forum for researchers and practitioners who are working on V&V and MDE. The main goals of the workshop were to identify the mutual impact of MDE and V&V: How can MDE improve V&V and how can V&V leverage the techniques around MDE? Thus, we asked for submissions that target the areas

- V&V techniques for MDE activities, e.g. V&V for model2model or model2text transformations
- V&V at the level of the models: techniques for validating a model or generating test cases from models, including simulation, model-checking, model-based testing, etc.
- V&V at the level of metamodels: techniques for validating meta-models (languages) or for using meta-models to validate other artifacts
- The application of MDE to validation, testing and verification

- Impact analysis of (meta-)model changes on validation. What is the result of a change in a (meta-)model on the previous results of validation?
- V&V techniques supporting refinement, abstraction and structuring
- Tools and automation
- Case studies and experience reports

In 2009, there were 21 submissions to MoDeVVa from 12 countries. In the review process, we chose 9 papers on mainly two topics: automatic transformations and verification. In most cases, both techniques were in combination. For instance, UML diagrams or domain-specific modeling languages were transformed in to Alloy for model checking, model transformations were used to influence the coverage of test suites, or automatic test generation has been done solely based on the UML Testing Profile and transformations expressed in QVT. More information about the program can be found at http://www.model-based-testing.de/modevva09/program.html . We have realized that transformations are currently a very quickly developing topic. They are very often used for attributing semantics to a model  for simulation, testing, execution or model checking. The verification of the transformations themselves is a promising topic whose foundations are currently under development. Since both topics of MoDeVVa are interesting and actual topics, we also plan to organize the seventh edition of MoDeVVa in 2010.

After the paper presentations, we also included a discussion session. Several questions were raised during this session that may point new directions for the future of necessary research. From those questions we retain the following: 1) What does it mean to generate a set of test cases from a model? 2) How can we be sure that a model has sufficient information to produce test cases? 3) How can we measure the interest or relevance of certain approaches to validating or verifying meta models, models, or code?

The first question poses a fundamental problem in terms of what it means to cover a test model. Can this be done in absolute terms, i.e. can we devise a universal informal or formal fashion of measuring coverage for any model? Can this be done for any specification language or should we restrict ourselves to particular coverage criteria for particular specification languages?

The second question relates not only to the level of abstraction that we are considering, but also to information related to the adaptor / test driver between the test cases and the SUT.

The third question is related to the previous, but in a more generic fashion. How can we measure the interest or relevance of certain approaches to validating or verifying meta models, models, or code? Many approaches, languages, tools and methodologies have been proposed, but the trend seems to be on keeping on proposing rather than evaluating. A possible answer to this question would be to apply in larger scale at the industrial level or let the questions from industry permeate into research in a more open fashion, i.e. to rethink the research questions in terms of what is demanded from industry. This may also mean that a step up from current research is needed in order to find meta tools that will allow this research to take place.

There were several practical lessons we have learned from the experience of organizing this workshop. Firstly we realized that our model for discussions at the end of the workshop was not optimal. We have suggested that the audience proposes topics and have then let the discussion on those topics be free, with minor moderation. This has resulted in a somewhat heterogeneous set of solutions, which was not simple to organize as a conclusion. A possibly more efficient fashion of organizing these discussions is to moderate the discussion on order to reach a certain goal. We may let the participants define the questions, but these will have to be in the sense of that defined goal.

Also, we have burned CDs with the conference proceedings in order to distribute them to the participants in the workshop. Although this was appreciated, we had some remarks on publishing the proceedings directly online so discussions among participants could be prepared beforehand.