MoDELS 2005 Doctoral Symposium Summary

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Abstract. The MoDELS Doctoral Symposium brought together nine doctoral students and five mentors to spend a day discussing student research presentations. A truly international representation among students and mentors provided a diverse opportunity to offer suggestions and advice regarding the vision and direction of the student dissertation ideas. This summary offers an overview of the activities that occurred at the Symposium.

1 Introduction

The Doctoral Symposium at the MoDELS conference took place at the Half Moon Resort in Montego Bay, Jamaica, on Tuesday, October 4th 2005. The Symposium provided an international forum for doctoral students to interact with other students and faculty mentors. The Symposium brought together doctoral students working in areas related to modeling and model-driven engineering. Participating students were provided the opportunity to present and to discuss their research goals, methods and results within a constructive and international atmosphere.

The Symposium was intended for students who already settled on a specific research proposal with some preliminary results, but still had enough time remaining before their final defense so that they could benefit from the Symposium discussions. Due to the mentoring aspect of the event, the Symposium was open only to those students and mentors participating directly.

Among the nine students selected to participate in the Symposium, six students offered a formal presentation and three students discussed their work through a poster presentation. The participating students, along with the titles of their presentations and their affiliation, were:

- *Preening: Reflection of Models in the Mirror*
  Nelly Bencomo, Lancaster University, UK
- *Transformation-Based Structure Model Evolution*
  Fabian Büttner, University of Bremen, Germany
- *Software Hazard Analysis for X-By-Wire Applications*
  Erendira Ibarra-Alvarado, University of Sussex, UK

- *Enhancement of Development Technology for Agent-Based Software Engineering*
  Andre Karpištšenko, Talinn Technical University, Estonia
- *Aspect-Oriented Modeling Research*
  Mark Mahoney, Illinois Inst. Technology, USA
- *SelfSync: A Dynamic Round-Trip Engineering Environment*
  Ellen Van Paesschen, Vrije Universiteit Brussel, Belgium
- *A Framework for Composable Security Definition, Assurance, and Enforcement*
  Jaime Pavlich-Mariscal, University of Connecticut, USA
- *Ontology-based Model Transformation*
  Stephan Roser, University of Augsburg, Germany
- *Modeling Turnpike: a Model-Driven Framework for Domain-Specific Software Development*
  Hiroshi Wada, U. Massachusetts-Boston, USA

The Symposium organizers worked hard to provide useful guidance for completion of the dissertation research and initiation of a research career. The mentors comprising the organizing committee included the following:

- Aditya Agrawal, MathWorks, USA
- Jean Bézivin, University of Nantes, France
- Betty Cheng, Michigan State University, USA
- Emanuel Grant, University of North Dakota, USA
- (Chair) Jeff Gray, University of Alabama at Birmingham, USA
- Jörg Kienzle, McGill University, Canada
- Ana Moreira, Universidade Nova de Lisboa, Portugal
- Kerry Raymond, DSTC, Australia

2 Summary of Student Presentations

Each student prepared an extended abstract that also appears in this workshop reader. This section offers a brief summary of the student presentations and poster discussion.

Nelly Bencomo's doctoral research represents the design and implementation of a set of metamodels for specifying a family of reflective middleware. The metamodels are used to capture the core concepts of the middleware design and the existing relationships. The initial metamodels have revealed a range of techniques to generate the appropriate components required by the middleware.

A presentation by Fabian Büttner introduced a transformation catalog for UML class diagrams that have OCL constraints. The problem addressed is how to evolve the static class models without rendering the associated OCL invalid. Each transformation must be verified as transformation steps that preserve the OCL.

The doctoral work of Erendira Ibarra-Alvarado is focused on a comprehensive safety approach for developing automotive software systems focusing on X-by-Wire

applications. In her work, the automotive application is modeled in UML with various safety assurance analysis techniques available.

Andre Karpištšenko discussed his initial work on integrating existing and emerging tools to provide a development platform for time-aware multi-agent systems; specifically, the integration of Real-Time UML (RT-UML) with Agent UML (AUML). The focus is on modeling techniques at the early stages of development.

Mark Mahoney spoke at the Symposium about his work on modeling reactive object behavior using statecharts and scenarios. The specific contribution of Mark's research is to realize that some of the properties in a Live Sequence Chart are crosscutting in nature and can be addressed by an aspect-oriented approach.

Hiroshi Wada's research centers on a generic framework that provides integration of arbitrary domain-specific modeling languages. In Modeling Turnpike, the core concepts from a specific domain can be represented in various notations and transformed to a final implementation.

A poster discussion was offered by Ellen Van Paesschen, whose work involves a dynamic approach to round-trip engineering with models. The heart of her approach uses a prototype-based language (Self) to provide a two-phased mechanism for rapid prototyping.

Another poster was presented by Jaime Pavlich-Mariscal. Jaime's research considers strategies for modeling alternative security concerns. The focus is an aspect-oriented approach to offer separation of the concerns between the modeling and code artifacts.

A third poster presentation was given by Stephan Roser, who discussed an approach toward model transformation that takes into consideration ontologies to derive the transformation. An application area of the proposed work may enable better integration during enterprise modeling.

3 Summary of Mentor Advice

At the end of the Symposium, each mentor was allotted several minutes to offer words of general advice regarding doctoral research and career advancement. This section provides an overview of the collective guidance offered by the mentors.

Doctoral research can be classified as a journey that requires a passion to be developed for the love of discovery. Along the way, many hurdles will need to be overcome that will require much patience. It is not unusual for a young researcher to be so zealous that they become depressed when the research does not progress at the speed they envisioned. Because there is more to life than research, the students were encouraged to also enjoy this special time in their life during their doctoral studies by developing new relationships and exploring activities outside of the laboratory. Socially and professionally, the network of contacts and friends that are established throughout the doctoral studies will serve as a lifelong source of support and opportunity.

The importance of a literature search was mentioned by several mentors. It was pointed out that the skill of exploring related research is not simply for the initial phases of the PhD, but rather an activity that will be useful throughout a researcher's

entire career. A characteristic of a good literature search is that it does more than simply enumerate references; a good literature search provides a comparative description that offers a discussion of the advantages and disadvantages of the related work. Strategies for compiling a literature search include keeping a database of papers that were considered along with annotations of important contributions of each paper. To a doctoral student in the early phase of their research, the criticality of the literature search is essential to understand what has already been done and what can be leveraged as possible extensions.

It was suggested to the students that they always be able to define their research problem concisely, as well as the associated questions on why the question is important. The key challenges of the problem need to be understood and explained well to others, in addition to the approach and method taken to offer a new contribution. The importance of being able to validate the results of the research is a critical part of evaluating the impact of the contribution and proving the merit of the approach to others.

As researchers, the students were reminded of the necessity of publishing the results of their work. Several reasons were provided to highlight the need to publish. First, publishing provides feedback from research peers that may be useful to influencing the direction of the dissertation. Second, writing throughout the PhD process also eases the burden of having to write a large dissertation at the end. Writing helps to provide structure to incubating ideas and also offers a historical account of the decisions and justifications made along the way. Third, the current competitive climate for research positions (both in industry and academia) has seen junior candidates for entry level research positions with multiple journal papers and dozens of other publications. To be competitive, a doctoral student must establish a pattern consistent with a researcher active in publishing results.

4 Conclusion

The fruitful exchange among mentors and students at the Symposium provided mutual benefit toward addressing promising research ideas for future exploration. Among the mentors, it was agreed that there are many future stars among the student participants and that it will be exciting to watch all of their careers unfold. It was suggested that the Doctoral Symposium be offered as an annual event at the MoDELS conference such that the future of the modeling research community can be fostered from the candid interaction that is provided by such a mentoring opportunity. Additional information about the workshop, including pictures of the activities, can be found at: http://www.cs.colostate.edu/models05/doctoralSymposium.html