Research Challenges in Domain-specific Modeling

• Quality of DSMLs
• Composition of DSMLs
• Usability of DSML-related techniques
• Other challenges

Brainstormed by Faruk Caglar, Filipe Correira, Gökhan Kahraman, Jeff Gray, Philip Langer, and Timo Wegeler at DSM’13 in Indianapolis
Quality of DSMLs

• What are adequate quality characteristics of DSMLs?
  – Can we adopt existing quality characteristics for DSMLs?
    • E.g., adopting quality characteristics of software products (in general) or of programming languages

• How to evaluate the quality of DSMLs quantitatively and qualitatively?
  – What are adequate evaluation methods?
  – Parts of DSMLs should be evaluated in separation, but is this possible for DSMLs (e.g.,
    evaluating the concrete syntax separately from the editor)?

• Quality is a matter of perspective
  – What are the stakeholders of DSMLs (domain expert, manager, developer, ...)?
  – Which characteristics are the most important ones for which stakeholder?

• Gökhan reported on his recent work in this area
  – He proposes an assessment method, which adapts the quality characteristics of software
    products to DSMLs and which takes into account “evaluator profiles” (different perspectives of
    a DSML’s stakeholder)
Composition of DSMLs

• Composition of DSMLs is crucial for increasing reuse in DSM
• Composing DSMLs have to address their
  – Abstract syntax
  – Concrete syntax
  – Semantics
• How can concrete syntaxes of multiple DSMLs be composed?
• How can the different semantics of multiple DSMLs be composed?

• Jeff mentioned existing work of the GEMOC project
Usability of DSMLs and DSML-related Techniques

• One important goal of DSMLs is to enable domain experts to specify their systems
• However, are domain experts without a background in programming really able to fully benefit from DSMLs and related techniques (e.g., code generation, model transformation)?
• Often, generated code or interpreters raise (runtime) errors while the model is valid
  – Such errors can hardly be traced back to the original error in the model by non-programmers
• How can the development of DSMLs and DSML-related artifacts be simplified?
  – Recent work shows that demonstration-based approaches seem to be promising
    • E.g., model transformation by demonstration
    • Metamodel specification by demonstration
  – Still lot of work to do!
Other Challenges

• Explicit specification of the semantics of DSMLs
  – No commonly accepted and widely used explicit semantics specification technique

• Co-evolution of artifacts that depend on evolving models
  – Approaches exist for metamodel/model co-evolution
  – A few approaches are available to address other co-evolution problems
  – However, these approaches are very specific to the respective co-evolution problem
  – A general approach that is usable for every co-evolution problem is strongly needed

• …
  – (we are sure there are many other challenges that were not listed above 😊)