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**Reference:** SEM\_Crowd(QSE:CSEK)

**Topic:** Defect Detection in Software Engineering Models with Crowdsourcing

LVA-Type: Praktikum, Bakk-/Diplomarbeit

Start: Ab sofort

End: Nach Vereinbarung

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## Background

Software Engineering (SE) Models have to be sufficiently correct and complete to effectively support SE processes, e.g., the generation of data/code. However, SE models often have a number of defects, e.g., syntax, model semantics, or domain-specific defects. While there is good tool support for model syntax checking, the detection of defects that need human cognition, e.g., to check the plausibility that a name for a UML class makes sense, can take significant effort for large models and should be better distributed on a group of reviewers, who may have different skills.

Crowdsourcing techniques enlist a large number of contributors to jointly solve a task. Typically, a complex task is broken down in several smaller units that can be solved in parallel, often with very small effort, and then results are aggregated to provide a solution to the complex task. Crowdsourcing has been shown to provide effective means for solving a variety of tasks that are difficult to automate, including image annotation or sentiment analysis.

## Tasks

This work investigates to what extent and how crowdsourcing-based mechanisms can be used to solve the defect detection problem in SE models. Currently, defect detection in SE models is often performed by a single person with specific skills and limited resources. The review can become a very resource-expensive task with large SE models. The thesis should:

- Adapt an existing process for defect detection with reviewing to systematically detecting a set of defect types in SE models.
- Identify mechanisms for breaking down the tasks in the defect detection process, e.g., planning the review, reviewing model parts, collecting defect

reports, into simpler units that can be executed in parallel and then joined into an overall solution.

- Consider how to measure improvements expected from defect detection in SE models with crowdsourcing, e.g., better quality (more defects found), efficient distribution of reviewing tasks, reasonable cost.
- Survey existing tools, e.g., Issue tracker, Collective Intelligence systems, Google Gerrit, to identify solution options for the tasks identified in the previous step.
- Design and implement a prototype tool support for defect detection in SE models with crowdsourcing based on the previously identified functions.
- Perform concrete experiments to measure the effects of defect detection in SE models with crowdsourcing regarding quality and cost.
- Report on the benefits and limitations, lessons learned for defect detection in SE models with crowdsourcing.

### **Experience and skills needed**

The following preconditions are recommended. Skills of using the following technologies can also be learned during the project.

- SE Modeling (UML)
- Prototype design
  
- Defect detection in SE models
- Crowdsourcing
- Collective Intelligence