

# Measurement of modeling abilities

Modeling abilities are a central item in the discussion about educational standards. Accordingly, measuring techniques for modeling abilities need to be discussed. In general, there are two different basic approaches: measuring the progress during the modeling process or evaluating the result. Here we focus on the results.

In this article, we show some difficulties that we detected during our lessons in software engineering at the university of Kassel. In that course we evaluated the modeling abilities of the students (not their knowledge in UML) on the basis of a homework consisting almost only of UML diagrams. For our solution of this problem we used so called *normactivities*. Normactivities allow to measure the size of an UML interaction diagram. The size of a standard solution to some modeling task may be considered as a measurement for the complexity of that task. This allows to measure the complexity of the modeling tasks addressed by an homework and enables a comparison of the quality of the homework with respect to the standard solution. We found out that the intuitively indicated rating by the teacher and our rating by normactivities gave similar results. During the evaluation we noticed that models of static contexts, e.g. class diagrams, are less interesting and of less effect to the measurement than models of dynamic processes.

Furthermore we discuss the difficulties in measurement of modelling abilities in general and specify some requirements on measurement techniques that result from this discussion. Therefore we rely on the measurement of mental models as a basis for information processing and solving problems. The resulting requirements we suggest are quite simple but not trivial: e.g.

- the measurement should take graphical models as well as textual described models into consideration.
- The functionality of the resulting model should not be marked.

3 major findings:

- list of difficulties we noticed for evaluation modeling abilities by the use of UML diagrams and in general
- our solution by using so called normactivities and first empirical results
- list of requirements for measuring techniques for modeling abilities and mental models

Overview of the research:

- This research is done by Albert Zündorf, Ira Diethelm, Leif Geiger and Christian Schneider, software engineering research group, computer science, University of Kassel
- In the area of software engineering we try to develop a basis for project cost and time estimation and project planning and project tracking. In the area of didactics of computer science we try to identify weaknesses of our development method i.e. development steps that consume much time due to misunderstandings and lacking background of the users. In addition, we try to come up with measurements for grading students work.

time of research: winterterm 2003/04

purpose: - first exploration for developing a reasonable evaluating technique for modeling abilities; Setting up frames for further work

brief description of methodology: - case study in a software engineering course at the University of Kassel