Christiane Differding: **Adaptive Measurement Plans for Software Development**

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Kurzfassung:

Goal-oriented measurement is a key technology for planning, tracking, and controlling software development products and processes, and the Goal/Question/Metric paradigm (GQM) is its most promising approach. Measurement principles have been understood and documented quite well through experience gathered in many measurement programs. However, detailed descriptions of systematic techniques for measurement planning are still missing. Most techniques are applied rather intuitively, which implies that the experience of the measurement planner plays an important role. Several critiques have been formulated about the GQM approach, e.g., difficulty of goal formulation, lack of consistency of the resulting set of measures, lack of models, lack of consideration of the software development process being measured, and difficulties with modification and reuse of measurement plans. Responding to these critiques, models have been integrated into GQM plans, templates and guidelines for goal-setting have been defined, and a reuse approach for measurement plans based on case-based reasoning has been developed. Nevertheless, the difficulty of goal-setting still exists, the problem of inconsistent sets of measures has not yet been solved, the software development process is not sufficiently taken into account during measurement planning, and modification and reuse of measurement plans are not yet sufficiently supported.

The goal of this thesis is to improve the GQM approach with a focus on modification and reuse. It investigates the following research hypothesis: Measurement plans that are consistent with project information can be developed with lower effort and fewer defects using the proposed reuse- oriented process than with an intuitive process based on the literature.

The approach to measurement planning presented in this thesis is based on reuse of project information, i.e., software development process definitions and quality models, during the development of measurement plans. The relationships that are captured between measurement plans and project information are used to modify a measurement plan based on typical modification requests originating from project information. The approach is developed in an iterative way and consists of several parts: a formal conceptual model for measurement plans integrated with software development process definitions and quality models, a measurement plan development process with a supporting tool, a measurement plan modification process with a supporting tool, and results from case studies and a controlled experiment that validate the approach. First ideas for a conceptual model for reuse and a reuse process are proposed.