Use Case Points 3.0

Implementation of an Use Case based Estimating Method for the Software Engineering of Business Information Systems

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Ever increasing industrialisation in software engineering requires improved methods for estimating business application systems at the time of request for proposal. This leads to requirements which cannot entirely be met by the currently known estimating methods. In praxis use case based specification forms are widely spread. Therefore, it would be desirable to be able to directly derive functional size measurements from use cases. An analysis of known estimating methods shows that the Use Case Points (UCP) method fulfils these requirements well, but it reveals some conceptual weaknesses in comparison to the widely spread methods like function points or COCOMO II.

In this thesis, the UCP method has been fundamentally revised and conceptual weaknesses have been removed. Thereby several ideas and findings from experimental physics and stochastics were applied to the field of software engineering during this process.

Firstly, a new conceptual view on the UCP method was developed. With regards to the functional requirements of a specification, a model-based approach has been defined to identify Use Cases and to transform different specification forms into a newly developed UCP language. Herewith, single instances of the UCP language can be mapped to a point metric. This new UCP model has been empirically validated by a field study with a total number of more than 200 estimations.

For capturing non-functional requirements of a specification, a cost driver model has been developed based on COCOMO II and on further models in literature and in industrial praxis. The cost driver model has been empirically validated by an expert survey with 25 participants.

The final solution, called *UCP 3.0* has been proven by 19 commercial software development projects with a total effort of more than 275 man years. For that purpose estimations were performed during an early project phase on the basis of a rough specification and were then compared with the actual project efforts after project close. UCP 3.0 in combination with a counting practice manual, results in a standardised estimating method with high reproducibility in industrial praxis and significantly improved estimating accuracy. In addition, an estimating tool and a best-practice example of its application complete the presented solution to build a sustainable approach for industrial praxis.

The method UCP 3.0 has already proven itself in the software house Capgemini sd&m AG.