An Innovative framework for software estimation based on COSMIC and Design Structure Matrix

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Abstract

Effective software project estimation is one of the most challenging and important activity in software development. In today’s highly competitive world, accurate software estimation can make the difference between successful projects and dismal failures. Proper project planning and control is not possible without a sound and reliable estimate.

For over two decades the software estimation issue has received more than its fair share of attention and any tools and techniques have been developed, cultivating expectations for improvements in the delivery of software on time and within budget. Techniques like expert opinion, analogy, algorithm models, function point and its derived are used by a lot of companies. Experiences and data confirm that estimation sizing is not so robust to have a standard and consistent estimation process. In that sense we can say that the software estimation still has a long way to go before finding the right answers.

This thesis, developed in the Ericsson R&D Italy, proposes a new estimation framework that, taking into account the state of the art of the project estimation techniques, has the goal to find a solution that can be attractive in terms of performance and usability in a business context.

Studying the historical projects trends in the R&D we observed that three factors can make the difference for the success of a right project estimation: first of all the availability of an reliable technique to measure software sizing in terms of functional requirements to avoid subjective estimation – “what you measure is what you get” is one of the fundament of the proposed framework. Second, the awareness that rework is a key factor that impressively impacts the project estimations. So the predictions of defectiveness should be done accurately instead of simply letting a buffer to limit unexpected impacts. Third, the possibility to have a tool that can simulate different planning scenarios having in input technical estimations, defect sizes, learning curves, and complexity parameters in terms of range definition.

The customisation of design structure matrix and COSMIC plus the definition of defect complexity curves are the components of this new estimation framework. The jointly adoption of these three components allows all stakeholders interested in the estimation result to have a common view on the prediction with objective data and to understand how changing functional and quality requirements can impact the initial estimation.

This thesis shows also the process needed to develop such framework, and the motivation that guided the selection of the used techniques. The experiments on significant projects validate the innovation of this framework in terms of efficacy and precision.