

Quantitative Metrics for Requirements Quality a posteriori

Tatiana Chuprina and Vincent Aravantinos
Fortiss GmbH
Munich, Germany
emails: {chuprina, aravantinos}@fortiss.org

Abstract—The question of "how to measure the quality of requirements?" remains problematic due to its subjectivity.

In this paper we present various quantitative metrics for assessing the quality of requirements assuming a relation between requirements quality and maturity of requirements i.e. number of changes in requirements document. We consider the number of corrections in requirements document done within requirements engineering (RE) and implementation stages; and their influence on the time for development process.

The proposed metrics are usable to assess the quality of requirements only after project completion. This method is a good tool for empirical studies.

I. INTRODUCTION

A. Problem

The question about quality of requirements remains problematic [1]: "How to measure the quality of requirements?" is a subjective question. There are only few quantitative metrics to measure the quality of requirements. All of them are looking at intrinsic characteristic of requirements and, therefore, depend on their statement.

B. Contribution

We present various quantitative metrics for assessing the quality of requirements assuming a relation between the requirements quality and changes of the requirements. Comparing with existing approaches, discussed in section III, our method considers a relation between quality of requirements and the resulted product measuring number of changes and time-consumption during RE and implementation phases. We consider the corrections in requirements document done within requirements engineering (RE) and implementation stages [2], and their influence on the time for development process. The suggested metrics take into account a maturity of the requirements and reflects its leverage on the product, resulting in a number from 0 (bad) - 1 (good) for a quality assessment. A developed system, which has passed an acceptance test by a customer, is considered as a baseline for the resulting product. Importantly, the proposed metrics are usable to assess the quality of requirements only after project completion.

The presented approach can be considered for empirical studies. The presented metrics are planned for measuring the quality of requirements in our current study regarding requirements categorization.

II. METRICS

III. RELATED WORK

A. what's quality means?

Despite on multiple publications about requirements quality and its assessment, the "quality" as a term is still subjective. [3], [4]. Industry standards [ISO/IEC/IEEE:29148:201] prescribe characteristics and criteria, which presumed effective for improving quality of requirements e.g completeness, unambiguity for sets of requirements and difficulty, dependency for a single requirement. Moreover, Lamsweerde provides possible defect-based checklist [5]. Now exists a vast majority of quality definitions:

- 1) in industry Standards - set of attributes such as completeness, unambiguity... [ISO/IEC/IEEE-29148];
- 2) in scientific point of view, [Lamsweerde] gives a general list of characteristics, [Pohl] proposed a framework defining dimensions of quality (• the specification dimension, • the representation dimension, the agreement dimension.) ;
- 3) check requirements language for lacking of errors, defects, ambiguity and possible reasons for incomprehension [];
- 4) different kind of quality models such as activity-based[10], natural-language requirements specifications[7]

B. Metrics for quality measure

- methodology for context-specific RE artifact quality measuring has in its base an activity-based quality model [activity, stupid!] - brief description
- the mentioned attributes should be satisfied
- some researchers shift their look to product quality measurement e.g [measuring success], however

All these metrics intend to intrinsic inspection of requirements. In contrast to them, we propose the quantitative metrics for assessment of requirements quality

IV. CONCLUSION

REFERENCES

- [1] D. M. Fernández, S. Wagner, M. Kalinowski, M. Felderer, P. Mafra, A. Vetro, T. Conte, M. Christiansson, D. Greer, C. Lassenius, T. Männistö, M. Nayabi, M. Oivo, B. Penzenstadler, D. Pfahl, R. Prikladnicki, G. Ruhe, A. Schekelmann, S. Sen, R. O. Spínola, A. Tuzcu, J. L. de la Vara, and R. Wieringa, “Naming the pain in requirements engineering: Contemporary problems, causes, and effects in practice,” *CoRR*, vol. abs/1611.10288, 2016. [Online]. Available: <http://arxiv.org/abs/1611.10288>
- [2] B. Farbey, “Software quality metrics: considerations about requirements and requirement specifications,” *Information and Software Technology*, vol. 32, no. 1, pp. 60 – 64, 1990, special Issue on Software Quality Assurance. [Online]. Available: <http://www.sciencedirect.com/science/article/pii/095058499090047U>
- [3] J. Mund, “Measurement-based quality assessment of requirements specifications for software-intensive systems,” Ph.D. dissertation, Technical University Munich, 2017.
- [4] H. Femmer, “Requirements engineering artifact quality: Definition and control,” Ph.D. dissertation, Technical University Munich, 2017.
- [5] A. van Lamsweerde, *Requirements Engineering: From System Goals to UML Models to Software Specifications*, 1st ed. Wiley Publishing, 2009.