A method for assessing confidence in requirements analysis

Kenneth Boness\(^a\), Anthony Finkelstein\(^b\), Rachel Harrison\(^c\,\ast\)

\(^a\) School of Systems Engineering, University of Reading, Berks, UK
\(^b\) Dept. of Computer Science, UCL, Gower Street, London WC1E 6BT, UK
\(^c\) Dept. of Computing & Electronics, Oxford Brookes University, Oxford OX3 1HX, UK

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Abstract

Context: During development managers, analysts and designers often need to know whether enough requirements analysis work has been done and whether or not it is safe to proceed to the design stage.

Objective: This paper describes a new, simple and practical method for assessing our confidence in a set of requirements.

Method: We identified four confidence factors and used a goal oriented framework with a simple ordinal scale to develop a method for assessing confidence. We illustrate the method and show how it has been applied to a real systems development project.

Results: We show how assessing confidence in the requirements could have revealed problems in this project earlier and so saved both time and money.

Conclusion: Our meta-level assessment of requirements provides a practical and pragmatic method that can prove useful to managers, analysts and designers who need to know when sufficient requirements analysis has been performed.

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1. Introduction

Whenever we attempt to engineer or re-engineer a software system it is widely accepted that arriving at a set of requirements in which we have a lot of confidence is the key to success [20]. However there has been little work to date on ways to arrive at estimates of confidence or on methods that can be used to determine how much confidence different stakeholders attach to a set of requirements. A large system may have very many requirements, each with a different set of confidences associated with it. Estimates of these confidences will help managers to make decisions concerning the costs and benefits of a project.

Previously we have reported on a technique for assessing risks during requirements analysis [2]. During subsequent case studies on real-world systems we came to the realisation that any method intended for use in the real-world has to be as simple and practical as possible if it is to have any hope of being adopted by industry. The new method we describe in this paper uses a simplified form of goal responsibility modelling [27] and replaces the probabilistic risk metrics of [2] with confidence assessments performed by experts using an ordinal scale. This is an important improvement because the probabilistic risk metrics used previously implied a level of precision which could not be guaranteed. Our new method further extends the earlier technique by moderating the assessments using argumentation theory [24] and propagating them within a system using tabulation. Our method is compatible with most requirements representations that depend upon the notion of stepwise refinement. We pay particular attention to the assumptions of stakeholders [8,9,18], which are so often neglected to the detriment of the development.

Our method for assessing confidence during requirements analysis can be summarised as follows:

1. Construct a goal decomposition graph.
2. Annotate the graph with estimates of confidence.
3. Determine the feasibility and adequacy of the requirements.
4. Consider whether the threats predicted by the feasibility and adequacy assessments are acceptable.

The method is a very practical approach to assessing confidence in requirements which extends our previous technique and is applicable to real-world requirements engineering. Without it managers, analysts, designers and developers are forced to make decisions about whether to continue analysing requirements or start building systems with very little information. The method is particularly useful during requirements analysis and the early stages of systems’ development such as the inception and elaboration phases of RUP, and could also be used for planning Scrum sprints. It can be used both with new systems built from scratch and when systems must be constructed using existing COTS.