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Requirement Risk Assessment Focused-on Stakeholder Risk Analysis

Xiaohong Li and Qiang Liu
School of Software, Tsinghua University, Beijing, China
xiaohong3341@yahoo.com.cn liuqiang@mail.tsinghua.edu.cn

Abstract

Stakeholders who directly affect requirements are rarely emphasized concretely in requirement risk analysis. In this paper, we propose a stakeholder-focused requirement risk assessment method where goal graph is used to express requirements' relationship. On account of different features, risk factors are analyzed separately between requirement providers and project team members divided from stakeholders. We estimate impacts on attainability and mandate of requirements mainly influenced by stakeholder risk.

1. Introduction

Stakeholder has been a recognized risk source of software project risk [1]. Especially in requirements phase, project team interacts directly with stakeholders to define requirements. But most stakeholders have a poor understanding of consequences of neglecting requirements. So it becomes a main challenge in requirement risk assessment. This paper explores how to analyze risk of stakeholder and assess impacts on requirements.

Requirement risk has been integrated into requirement process [2]. A model called outcome-based stakeholder risk assessment model (OBSRAM) [3] is proposed to provide practice guidance for identifying and managing risks arising from stakeholders. It's taken as our starting point of risk analysis about stakeholder. Goal graph is used to describe requirements' relationship in one technique for assessing risks in requirement analysis [4]. It informs our work of requirements' relation.

However, stakeholder isn't taken as a risk factor in [4]. OBSRAM doesn't connect stakeholder risk with requirements. Few methods classify stakeholders or analyze their risk concretely. In this paper stakeholders' risk factors are analyzed and then requirement risk is assessed based on risk analysis of stakeholders.

2. Risk analysis of stakeholders

Here, stakeholders are divided into requirement providers and project team members by their responsibilities. Requirement providers include direct requirement providers and managers who may have impacts on requirements but needn't provide requirements directly. Their risks are embodied by analysis of risk factors.

2.1. Risk factors of requirement providers

To analyze risk of requirement providers, six risk factors are explicit according to their features.

1) Impact of system: It means how system functions influence relative stakeholders. Its degree is estimated from 5 (very bad impact) to 0 (no bad impact).

2) Agreement with requirements: It means degree of providers' attitudes about confirmation on correlative requirements. It's measured on the scale from 0 (completely sure) to 5(totally uncertain).

3) Participation level: It means whether providers participate voluntarily. Its criterion is from 0 (very voluntary) to 5 (very passive).

4) Expression skill: It means the ability that providers express their requests. It's measured by experts' marking through professional tests. It's measured on a scale from 1 (the best) to 5 (the worst).

5) Importance extent: It is measured by combination of status and influence level directly on requirements. Status is ranked at three levels: organization level (3), project level (2) and team level (1). Influence level recognizes that providers whose work has the capability to influence requirements in a larger portion. It's measured on a scale from 1(the least important) to 5 (the most important). Then importance extent is computed as: Importance extent = Status*Influence level.

6) Profession level: It means whether they have experience in such similar projects and is measured by time working in the industry. Three grades are made: less than one year (3); between one year and three years (2); more than five years (1).

2.2. Risk factors of project team member

Five risk factors are introduced for project team.

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1) Technology skill: It signs technology each member needs in requirement phase. It's marked by domain experts on a scale from 1(very good) to 5 (very bad).

2) Description skill: It signs ability to describe problems or requirements. Also, it is marked by experts on a scale from 1 (very good) to 5 (very bad).

3) Stability of work: It signs whether member takes part in several projects or whether personnel rearrangement is frequent. It can be measured on a scale from 1(very stable) to 5(very unstable) by department leader.

4) Time pressure: It signs if the project has enough time. The pressure is always from clients. It is measured on a scale from 0(very enough) to 5 (very scant).

5) Status: It's the same as that of providers.

2.3. Relationship of risk factors

Risk factors are concluded from personal skills required and problems encountered in requirement phase. Importance extent and status aren't direct risk factors. However, they are useful when other risk factors are the same. Inner relations don't exist among these risk factors. So, all of them should be paid attention to. Stakeholder's integrated score is also important.

3. Risk assessment of requirement

The relation among requirements and risk assessment of requirements are main content of this part.

3.1. Requirements' relationship

A requirement goal graph is proposed in [4]. From it and goal-oriented requirement engineering, we generalize our requirement graph as shown in figure 1.

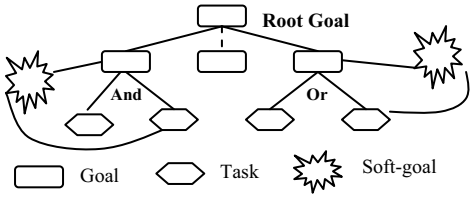

Figure 1. Requirement Goal Graph

The requirement graph is composed of a number of root goals, with a hierarchy of sub-goals connected by refinement relations. Sub-goals satisfy their superordinate goal in conjunction (and) or as alternative realization (or). Leaf goals have no refinement but can be expressed in operational terms and assigned a method by which the goal is satisfied. In order to distinguish functional requirement from non-functional one, task is used to replace sub-goal. Task is functional requirements and soft-goal means the other. The use of goal graph doesn't mean project must adopt goal-oriented method. It's convenient to express relation of requirement.

3.2. Risk assessment

Two factors of requirement are assessed: attainability and mandate. They are defined in [4]

Attainability is impacted by all factors, except impact of system. Mandate is influenced by agreement with requirements, expression skill, profession level, time pressure and description skill. On the base of quantitative measurement, the risk factors of requirement can be computed by formula 1:

$$\frac{\sum_{1}^{n_1}(\mathrm{Im}\times\sum RRF)}{n_1}+\frac{\sum_{1}^{n_2}(St\times\sum PRF)}{n_2} \quad (1)$$

Im is contraction of important extent and St is that of status. RRF is relative risk factor of requirement providers, and PRF is that of project team member. n_1 is the number of requirement providers, and n_2 is that of project team member. Attainability and mandate are computed respectively from their own relative factors.

4. Conclusions

Respective risk analysis of stakeholder makes it easy to find out cause of risk. Stakeholders' impact on requirements risk is embodied by their risk factors. It's helpful in requirements decision-making in early phase. And risk can be found as early as possible.

5. Acknowledgement

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6. References

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