A Collaborative Situational Method Engineering Approach for Requirement Gathering: A Re-Defined View

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ABSTRACT

This article re-defines traditional requirement engineering processes by performing exhaustive requirement gathering through an interactive and collaborative communication, where stakeholders are equally involved in capturing and finalizing requirements in the scope of a project. It strongly supports concept of re-usability using principals of situational method engineering where methods are tailor-made per requirements from the method repository (maintained in the cloud). Search and selection of appropriate methods meeting stakeholder’s interest is performed using concepts of knowledge discovery and data mining methods over a web interface. Knowledge extraction, in the form of a matched set of requirements is performed at every level of a proposed multi-layered framework, as progression towards a desirable method for reuse. This approach will help in overcoming the challenging tasks of identifying relevant requirements, incorporating change requests and minimizing the number of disagreements between stakeholders and developers.

KEYWORDS

Cloud Services, Knowledge and Data Mining, Method Engineering, Natural Language Processing, Requirement Engineering, Requirement Gathering, Situational Method Engineering, Stakeholders

INTRODUCTION

Requirement engineering (RE) according to (Harmsen & Brinkkemper, 1994) is “…a sub discipline of systems engineering and software engineering that is concerned with determining the goals, functions, and constraints of hardware and software systems.” Studies have shown that RE does not receive more than 2-4% of the total effort applied in the entire project (Firesmith, 2004), thus making it a time-bound phase. Weak requirement analysis may lead to software failure (Hofmann & Lehner, 2001), which in turn results in customer dissatisfaction and risk of inflation in cost of the project. Therefore, developers must ensure that all business requirements are captured correctly (with clear vision and scope) and the solution is designed to meet its requirements by focusing on delivering value to the customer. To achieve this, it becomes essential to increase customer involvement in requirement gathering process to understand the interest of all project stakeholders. Various parameters have been considered such as importance, business value, stakeholder preference, cost of development, requirement quality, development risk and requirement dependencies into consideration as stakeholder involvement. The stakeholder might present a vague, incomplete or ambiguous requirement but only

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(s)he will be able to help in clearly defining the business objective, as (s)he represents that face of organization. Thus, stakeholder involvement in turn, will help the development team to stay focused on delivering value to the business.

Hence, there is a need to adopt efficient and cost-effective ways of requirement gathering which will help in a) minimizing disagreements between stakeholders and developers b) increasing stakeholder and developer collaboration c) understanding stakeholders and developers responsibilities in the requirements engineering process d) providing a platform for developers to learn how to effectively collaborate with stakeholders to certify whether the requirements are thorough, clear, feasible and testable e) minimizing the overall risk associated with development f) connecting project objectives to business requirement g) acting as a platform to negotiate all disagreements to a position of agreement h) decreasing the amount of changing requirement requests i) reduction in time and cost of delivery j) increase in stakeholder satisfaction.

In this paper, we present an interactive and collaborative approach among stakeholders and developers for requirement reusability using the concept of method engineering (ME). Method engineering is the engineering discipline to design, construct and adapt methods, techniques and tools for the development of information systems (Kumar & Welke, 1992), (Heym & Österle, 1993), (Slooten & Brinkkemper, 1993). Methods are generic in nature and are never followed literally. Rather they are tuned to specific situation, as one development process strategy cannot be effectively applied to all project contexts and situations. Determining the correct selection of methods from the method repository requires experience and knowledge of the project team. This led to the development of method engineering domain and more particularly of situational method engineering (Harmsen & Brinkkemper, 1994) which assumes existence of a method repository from where method (s) of interest are retrieved, modified or assembled into a new method that is subsequently stored in repository. Brinkkemper defines the SME as “…the discipline to build project-specific methods, called situational methods, from parts of the existing methods, called methods fragments…” (Brinkkemper, 1996). Hence, the objective of the SME is to provide rapid method engineering techniques based on the reuse of the existing method parts in the construction of new methods, more flexible and better adaptable to the situation.

In the light of situational method engineering domain, we propose a multi layered interactive and collaborative method engineering process where stakeholders are equally involved in capturing and finalizing requirements of their interest. This multi-level requirement engineering process consists of representation of interest of stakeholder as interest base and details pertaining to structure, design and other parameters like correlation among methods of method structure dependencies among method(s), their probable efforts and techniques as descriptive base. To implement this model on large scale we use the concept of cloud computing and web application. This data is kept in optimized way using artificial natural techniques to facilitate gathering of all possible requirements of a project by using the information from the previously developed similar projects stored as historic data (method repository) over a cloud. Method repository here refers to the collection of data which provides support for selection and manipulation of method(s). This paper adheres to the definition of method repository given by Saeki (Saeki, Iguchi, Wen-Yin & Shinohara, 1993), stating that a method base (central repository) is a description of database from where several complete methods can be stored and selected for reuse. It also uses the concepts of natural language processing, knowledge and data mining for matching and extraction of relevant requirements over the cloud (Islam & Inkpen, 2008). Knowledge extraction in the form of matched set of requirements is performed at every level of proposed multi layered framework, to build the confidence of progression towards desirable method(s) for reuse. This will help in overcoming limitations of traditional ways of requirement gathering and negotiation and hence will cover all a) to j) points stated above as benefits of proposed work.
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