Using Web Services and Mobile Devices to Reuse on Requirements Engineering

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Abstract: Agility in software specification has been a key feature aimed by development teams. An important concept in this context is reuse. MROBJER is a method that supports goals and scenarios reuse through analogies among complex software systems. FROBJER is computational tool which was developed to support MROBJER application. However, this tool performs reuse in a standalone way using a local database. This paper presents a platform which involves Web service and a mobile application to improve FROBJER architecture. This approach allows MROBJER to run in a mobile platform through FROBJERMobile application.

1 INTRODUCTION

Software specification includes the requirement engineering phase which aims to improve software product analysis and modeling. This phase includes activities to elicit software requirements (Sommerville, 2006). A requirement is a description of something the system is able to carry out to reach its goals (Pfleeger, 2001).

One challenge is to get more accurate requirements allowing good understanding of what is expected in a new application (Pressman et al., 2005); (Sommerville, 2006). Requirements representation may often be subject to redundancies, inconsistencies and misunderstandings. As it demands a notable effort from the developer, researchers propose solutions for this phase to promote the understanding, management and maintenance of requirements set describing the new system. Reuse brings several benefits to the development and may lead to software with more quality.

Aiming to reuse requirements, Fook and Abdelouahab (2001) propose a goal reuse method called MROBJER. A computational tool was developed to support method application, FROBJER. The early version was developed in Desktop platform. The massive mobile devices use and Web technologies in application development platforms demanded for an FROBJER architecture expansion. This expansion provides more flexibility, mobility and decentralization in MROBJER application. Requirements engineer can apply the method anywhere by Internet from a mobile phone, for instance. Our main motivation is to provide a tool which allows method application in a large-scale.

This paper presents FROBJERMobile architecture. The expansion will take to new perspectives to the requirements engineers, and MROBJER application may occur more widely.

2 RELATED WORK

Researchers proposed several methods to discovery, management and maintenance of requirements over the years. Some examples are GORE – Goal Driven Requirements Engineering, KAOS – Knowledge Acquisition in Automated Specification (Dardenne et al., 1993), and ESPRIT CREWS (Rolland et al., 1998). Many Methods do consider software tools to discover, analyze and verify requirements, but only a

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few consider software tools aiming for requirements reuse.

Many authors refer to software system functional requirements as goals. Sem and Hemachandram (2012) present goals as a method to identify requirements during the requirement engineering phase. Rocco (2002) asserts that software goals settle guidelines to organize what is being needed by users.

Based on this perspective, Fook and Abdelouahab (2001) proposed a goal reuse method for requirements engineering, MROBJER. This method focuses on improving requirements elicitation, analysis and validation. Authors develop FROBJER, a computational tool to apply MROBJER. Differently from the proposed tools, the reuse is the focus of FROBJER.

3 MROBJER

The goal reuse method for Requirement Engineering, MROBJER, allows the goals and scenarios reuse through complex applications analogy. Authors consider that clients can easily list goals to be reached in their tasks.

First, requirement engineers map a structure to compare applications from the same or different Domains, and then they identify the goals. In this method reuse is not restricted to systems from the same domain, but they also include systems from different domains. There are different mapping levels, such as software domain and the subdomain.

Following, the application is mapped as functional aggregations set. Generic goals are also identified with their respective scenarios. Requirements engineers list goals considered generic, the ones which may be common to other applications. The approach proposes a generic goals representation:

$Gen_{Goal}N$ = {Domain, "Description", Main Verb, Main Object, <Parameter> [0..n]}, where:

N: is the Goal identification number;

Description: is goal brief description;

n: number of goal parameters.

The verb and the main object of a generic goal are identified. The generic goals contain variable parts and are labeled parameters. They are identified by determinants < >. Once the generic goals are formatted, requirements engineer inserts all the structure into a repository. Figure 1 shows the structure mapping which allows goals reuse.

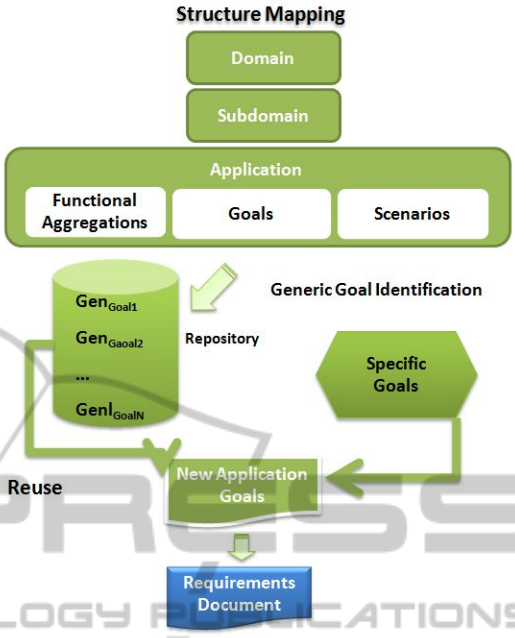

Figure 1: MROBJER Process (Castro and Fook, 2011).

The reuse happens whenever a new application uses one or more generic goal from the repository. Generic goals and scenarios can be partial or totally reused by the new application. In case of partial use, a parameterization process occurs. After reusing the new application specific goals are included into repository. The FROBJER produces a document which can serve as a basis to the new application Requirements Document. For more details on MROBJER application, it is suggested to read Fook and Abdelouahab (2001).

Although MROBJER may be applied in manually way, it becomes difficult to keep mapped structures in simple text documents due to information amount in these files. Thus there is a tool to support MROBJER, FROBJER. This program improves the method application through a database repository instead of text document. Besides, it supports best application of goals and scenarios parameterization during partial reuse. Next section presents FROBJER architecture.

4 FROBJER ARCHITECTURE

Once the new application is mapped, FROBJER allows the requirements engineer to apply MROBJER in a short time.

Despite this advantage, FROBJER Desktop version does not allow for more than one engineer to use the method application in different locations at the same time. Thus, authors proposed an expansion of FROBJER architecture. They developed FROBJERMobile software to support a distributed way of MROBJER application. This approach makes available the mapped structures in a Web server repository. The analysts may access the repository from mobile devices when visiting clients, for instance. This feature removes local barriers, and requirements engineers can work from anywhere. There are three layers in this architecture expansion as shown below.

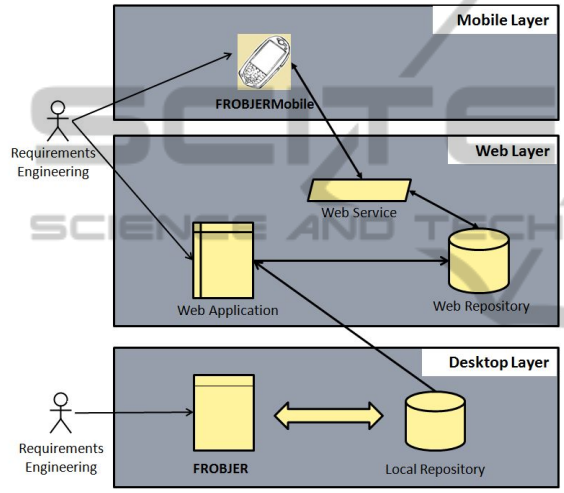

Figure 2: FROBJER expanded architecture.

FROBJER architecture involves Desktop, Web and Mobile Layers. The Desktop layer is part of the FROBJER original architecture where the local repository is kept in a local repository. The Web layer and Mobile layer are part of FROBJER architecture expansion. The Web layer includes the Web repository, the Web application and the Web service. The Mobile layer consists of an application developed to mobile devices.

FROBJER, Web service and FROBJERMobile Android applications were developed in Java (Armstrong et al., 2003); (Android Portal, 2012); (Mednieks et al., 2011). Local and Web repository are MySQL databases. Each layer will be described in the following sessions.

4.1 Desktop Layer

The Desktop layer consists of an FROBJER Desktop version which allows the standalone use by the client. Its interface provides all mapped structures visualization. It is also possible partial or total reuse of generic goals and its scenarios. This application produces a document with new application goals.

4.2 Web Layer

The Web layer is an intermediate layer, and includes a Web repository, a Web service, and a Web application. The Web application synchronizes the local repository with the Web repository while the Web service intermediates this repository and the mobile application. The Web service access the Web repository for querying and updating from mobile application.

4.3 Mobile Layer

The Mobile layer includes the application which allows many Requirement Engineers to access mapped structures in the Web repository from mobile devices. They may be in different geographic locations to access the Web repository in real time, this way providing flexibility, mobility and new work perspectives.

This application, called FROBJERMobile, was developed in the Android platform using Java Programming Language (Armstrong et al., 2003); (Chappell and Jewel, 2002). Figures 3, 4 and 5 show some interfaces of the mobile layer application.

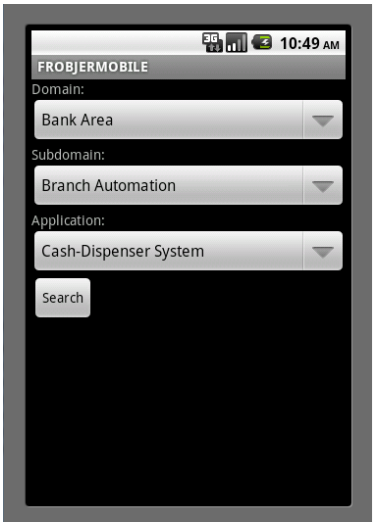

Figure 3: FROBJERMobile Interface.

Figure 3 shows interface to select an application and its mapping. Thereby it will be able to analyze generic goals and perform reuse.

Figure below shows a selected goal is shown in this interface to be reused. The items between "< >"

are the parameters which may be altered in case of partial reuse. For each generic goal to be reused there is an available scenario.

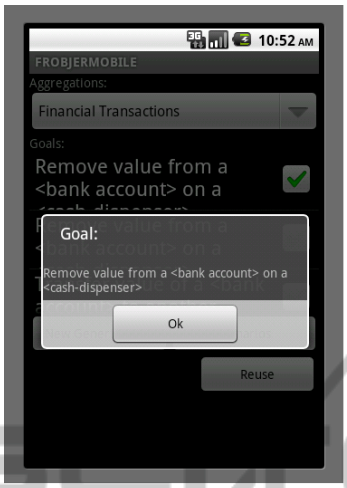

Figure 4: FROBJERMobile – Goal visualization.

Figure 5 shows the FROBJERMobile interface to manage these scenarios.

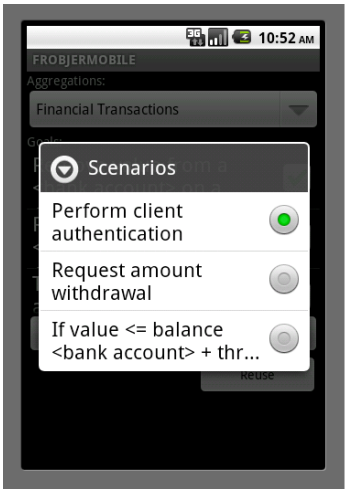

Figure 5: FROBJERMobile – Scenarios.

The scenarios describe a generic goal in the Web repository. In this case the user may select the one to be reused.

5 FINAL CONSIDERATIONS

This text presented the FROBJER architecture expansion. This new architecture allows a new way to apply MROBJER through mobile devices application, FROBJERMobile. Now, requirements engineers are able to elicit and reuse requirements using a cellular phone.

It is believed that this new way will bring out flexibility and resources to help up with the complex specification activity.

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