

Challenges for Reuse in Web Engineering

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Abstract- Web engineering is a discipline which deals with the web based systems and applications, their analysis, designing, cost effective development, operations, testing of web applications according to their operations needed to be performed and maintenance of the high quality applications. There are many things which are common in many websites in a particular domain. By reusing a successful web based application, another one can be developed. But reuse in this case is not easy. This paper highlights some of the challenges for reuse in web based applications.

Keywords: *Web engineering; Usability; Security; Navigability; UML*

I. Introduction

Web engineering is everywhere and is becoming more and more integrated part of small and large company's business strategies. And it is spreading at a very fast pace. Almost everybody now-a-days wants to host their own websites and web based applications on the net. As a result, million's of websites get hosted daily and become a part of the vast network. It's also encouraging to see that as companies are hosting their websites, they have recorded a tremendous increase in their business. Earlier the website used to be static but now these are changing to dynamic. The logic behind the design of dynamic websites is web engineering. As a traditional software process development, web engineering also has many phases of development. There are some portions of a websites which are common to all websites. Thus, those parts can be designed from a reuse point of view to save time and efforts. This paper summarizes all the phases of web engineering and the one where reuse can be applied.

II. Phases of Web Engineering

Generally, the following phases are used in webapp development. But these may vary according to the engineer also. The phases are as follows:

A. Customer Communication

It is the first and foremost step in webapp development as it deals with collecting the requirements to get an idea why the web application needs to be developed. In this phase, there are two major tasks to be done, first the business analysis and secondly the formulation.

In business analysis we find why we are developing the web based applications, what help it can do or advantages it will provide to us, and will the new application be integrated with other applications and database.

Formulation is the activity which deals with customers and asks for requirements specifically to their needs, or gathers information through survey if it is not being developed for a particular customer. The web engineer must ask a lot of questions to get the proper understanding of the requirements and what problems it can solve. Some of these questions can be: what is the purpose of the webapp, who are the target audience, any specified type of look and feel required, etc.,

B. Planning

After getting the requirements, the next step is planning. In this step, usually the strategies about how to proceed with the requirements are gathered and some meaningful things are developed out of it. During planning, we do consider things like what technologies should be chosen to work upon, approximate time span needed to complete the project work, taking care of business goals and interests of the company and understanding how to achieve those goals, risk related to the project, testing and quality assurances activities, even the post release activities, etc.

C. Modeling

It is the process which gives us the blue print or a model using which we can develop the web applications. During designing of a site map, the developer should keep in mind the generic views as well as some

specific views, as these views are the guidelines for development. The design however must contain enough information that shows how the developer can translate the requirements into the final product. The designer must adhere to the requirements and make designs accordingly. If the designs are made for unknown users, the developer must do a check on the likes and dislikes of the target audience. The design goals that must be followed while developing a web application regardless of its domain, size or complexity are: simplicity, consistency, robustness, navigation, visual appeal (look and feel) and compatibility [1].

D. Construction

In this phase, the actual functional webapp is developed. The aim is to develop a good interface which is easy to understand and navigate. The navigation is an important part while dealing with web applications because the visitors must be able to navigate the web application easily. There should be no dead ends in the web sites, the user must at least be able to reach home page from the current page. The navigation helps a user feel comfortable with the interface. But the question arises how to manage the links between the functions provided and the objects providing them. For this we have to apply the relationship-navigation analysis. This provides a series of steps which help us to identify the relationships.

Some basic rules must be followed while development these are - not too much text on a single page which makes it monotonous and boring to read, use of minimum animation and that too according to need. The development needs a wide range of skills, so team's are made and roles are assigned to people accordingly. Some of the roles assigned are content developer, web publisher, business domain experts, administrator, etc. Building a team is not an easy task and making a team who jells together is certainly not. Certain key points must be remembered while building a new team such as establishing set of team guidelines, need of strong leadership, commitment from each member, etc.

There is an important step in the life cycle where the testing of your webapp is done. Testing begins with the completeness of functionality, user interface, design architecture, navigation, component, integration, configurational testing, performance testing and the cross browser compatibility. So the developer must ensure that whatever he codes must be in accordance with the current technology and standards.

E. Delivery and feedback:

Once the testing gets over and the developer gets an approval from one and all, the webapp is delivered to customer. The development is not over after delivery, as the developers have to deal with the recent technological changes, updating new content or offering new products.

The customer feedbacks are also important to keep the webapp updated. All these updates do help in maintaining the traffic and also needs changes according to customer's interests.

III. Challenges for Reuse

Over the past few decades, the web application developed has become complex from simple implementation earlier. For example, the number of users has increased tremendously, the expected time for development has reduced but change in requirements has increased a lot [8]. Due to this, there are a number of challenges faced in each life cycle phase of web based application development. Some of these are summarized in Table 1.

Table 1: Reuse Challenges in Web Engineering	
Web Engineering Phase	Reuse Challenges
Requirements gathering	Complex and rapidly changing requirements, wider scope , multiple users with different cultures leading to more variations and conflicts in requirements
Planning	Time constraints; cost effectiveness[2]
Design	Object orientation to promote reuse of objects across websites[3], data structuring capabilities to reuse the data structures effectively [4], genericity, flexibility and adaptability, navigability and usability, use of UML [5]
Development	Complexity, changeability, invisibility and unrealistic schedule [6]
Testing and delivery	Vast users with different demands, so extensive navigation testing and usability testing; security testing for web application transmitting secure data like online shopping and banking etc; stress and load testing to see the effects on performance with increase in the number of users accessing the web sites; rigorous regression testing.
Maintenance	Availability; immediacy; concurrency; network intensiveness [7]

CONCLUSION

Web engineering is important as the use of webapp's is increasing with use of Internet and technologies like cloud computing, grid computing etc. In order to find the scope of reuse in web based applications, this paper highlights some of the challenges that must be handled effectively. All should be considered critical in order to succeed in high level of reuse in webapp's development which can reduce

the time, effort and cost by a large proportion and also improve the quality of the web based applications.

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