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Key Challenges Of Development Process Of Building Web-based Business Applications

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KEY CHALLENGES OF DEVELOPMENT PROCESS OF BUILDING WEB-BASED BUSINESS APPLICATIONS

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ABSTRACT

World Wide Web benefits people by disseminating information limitless for various reasons. Web-based business applications as platform used greatly for communication between people and businesses. Thus, web developers facing some challenges throughout web-based business applications development include its processes to conform business excel. This paper examine the results of a research exercise involving comprehensive literature studies and other relevant information analysis, which aims to discover the key challenges during the development of web-based business applications. Such key challenges may consider important for web developers to building better web-based business applications.

Keywords: Web-based Business Application, Web Development Life Cycle, Key Challenges.

INTRODUCTION

Web-based business applications (WBA) also refer to web applications are widely used by many businesses striving to reach the acme of business success which generally refers to software applications present on the web that allows web users to obtain substantially complete access to these applications through a web browser [12].These applications can be corporate sites or enterprise applications as well as shopping portals. Thus, in this research, both purely web-based and partially web-based software applications are considered. The demands of such applications allow businesses to explore better prospects or opportunities for themselves as well as for web development companies to enhance their services in developing these applications for customer satisfaction.

In developing these applications, the existing methodology – software or system development life cycle (SDLC), needs to be adapted and innovated to suit the nature of the web environment – a blend of web-based techniques [27]. This adaptation and innovation of development life cycle has raised the new term for development methodology that is web development life cycle (WDLC) [1]. This paper therefore, discusses key challenges of development process in building web-based business applications in which there are certain special characteristics of WBA development.

The paper is organized as follows. Firstly, we provide background information about the development process of WBA; Secondly, we present and discuss the key challenges that linked to the development process of WBA. Finally, we describe our conclusion and further research.

RELATED WORK

Web-based business applications are extensively being used due to the fact that their special nature and characteristics differ from conventional applications. For example, capability of a web application runs in different web browsers can potentially provide accessibility to anyone anywhere at any time [10]. Additionally, it provides flexibility and convenience to people and also may be beneficial to organisations for expanding their businesses. Furthermore, the types of web-based business applications are becoming more sophisticated and new features are added to replace the use of desktop applications [2]. For example, Google online office applications (purely web-based) provide similar functions as Microsoft desktop-based office suite provides. It is also noteworthy to point out that many software systems are becoming web-enabled such as Microsoft SharePoint which offers a web front-end.

Although much of the research has been done in web design processes, there are more issues found for development processes, in particular within the stages of WDLC. Similarly, these issues can also be viewed in traditional SDLC because of its adoption in creating WDLC. However, as this research study is focus on the aspect of WBA development, WDLC method is taken into account to address many additional challenges in regards to the unique requirements of WBAs. It seems that having WDLC method as an approach to WBA development, will successfully build large-scale, complex web applications [4].

In developing a web-based business application, both technical and management aspects are

needed to ensure web developers use proper development techniques and meet business requirements [25]. As a web application grows in size and complexity, requirements gathered should be clear and understandable for all stakeholders. Skills, attitudes, knowledge and experiences from different stakeholders could influence the web development processes to be efficient [15]. The key challenges of development process of WBA are described further in this paper that may assist web developers in building better WBAs.

METHODOLOGY

The research methodology used in this study has three main activities which focus on discovering key challenges for improving the development process of WBA, as illustrated in Figure 1.

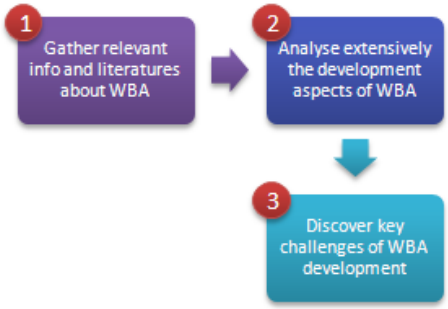

Figure 1: Research methodology

The research first has to gather intuition and relevant literature about WBA from published journals and conference papers. Next, from the collected information and literature, the analysis took place extensively to search for development challenges. Then, the key challenges of building WBA are discovered for web developers to know what they are facing when building WBAs.

DEVELOPMENT PROCESS

A number of development methodologies has been used for building web-based business applications which consists of several stages with particular activities that need to undertake. Extensive literatures about web-based development processes indicate that Abou-Zahra's [1] development life cycle (refer to Figure 2) is the most applicable and its generic processes are capable to develop a range of web applications. These development life cycles adapts ISO 12207 Software Life Cycle Processes for web-based application development and therefore chosen as a lead model to collect more information about WBA development.

Requirements Stage

Collecting data and requirements from clients and analyse them are the main activities in this stage. As the nature of web environment, considerations on who would the users like which may be limitless but unlike the conventional software applications that have limits number of users who access those applications. The relevant content and appropriate languages used in the applications need to be taken into account prior to approval or sign-off requirements which is all depends on what to be developed and whom to develop for [14].

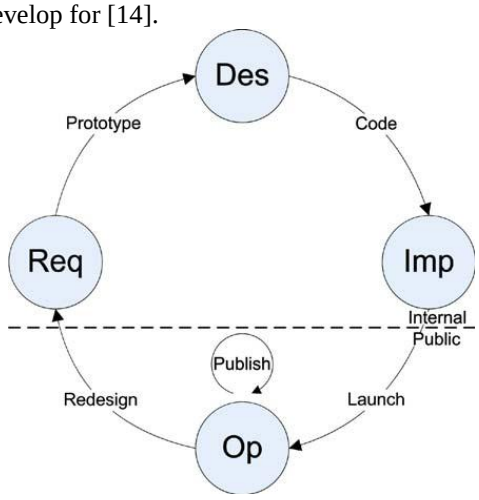

Figure 2: Web development life cycle [1]

Design Stage

High-level and low-level design and technical specification requirements are prepared in this stage. It includes interface design, database structure, architecture design, navigation flow and pluralistic design [14]. Next, prototype is created in this stage to conform the requirements from the clients. Design activities will be frequently updates until the clients are satisfied to the design and mock application before the actual development takes place.

Implementation Stage

This stage is where the actual web-based business applications are start to develop. Web characteristics and uniqueness should be concerned throughout the development to ensure the WBA meet the target audience intention to use. The development activities also involve application testing to test the module for functionally working as a complete application. Testing WBA with multiple browsers [5] is important for application compatibility as well as the convenience of web users in using their own preferable browser. At the end of this stage, the web-based business applications are tested with error free and ready to be moved into production or simply go live.

Operation Stage

This stage consists of two major activities. First, publish the completed web-based business applications and second, maintain that applications. Publishing is where the WBA resides in the web server for accessibility either

hosted at web hosting company or at client's own site [21]. Search Engine Optimisation or SEO can be applied to organisations for top ranked web search results [20]. To ensure the application is well-maintained, evaluation activities will take place and later implement relevant improvement or changes where necessary according to what has been decided.

KEY CHALLENGES

In doing business, the web-based business applications as communication platform, are significant to the organisations to disseminate and distribute timely information across a global organisations. From the comprehensive literature, it was found that there is a number of key challenges need to be taken into consideration by web developers when developing web-based business application [6]. It covers from beginning of the early development until completed applications. The key challenges presented here (see Figure 3) are among the most significant which is based on the nature and characteristic of web-based application, but not limited to.

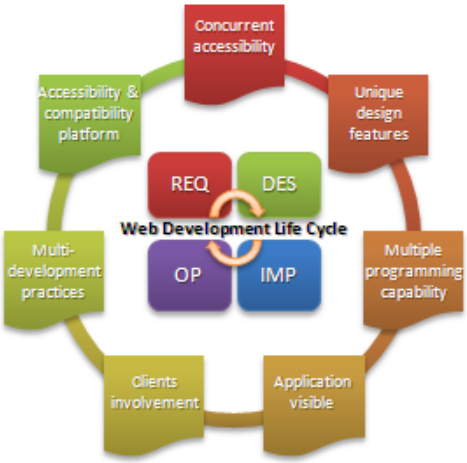

Figure 3: Key challenges of WBA development

Concurrent Accessibility

Conventional software applications have a certain users which is very specific within a set of boundaries, divisions or organisations [23]. It is determined at the earlier stage during the analysis of development requirements. If access to the software application involves a small number of users, the development of such application to provide the concurrent accessibility is seems practical but for a huge number of users globally, this is where the web-based business applications are developed for.

The users for WBA can be from a wide range of groups, either locally or globally with different background include social, cultural and languages [26][22]. Unlimited boundaries with unlimited web users can be considered one of the key challenges in building WBA for global access concurrently to effectively reach the target market and achieve business objectives [16].

Unique Design Features

Creating the design features for a conventional software application is usually depends on the project specification and its objectives. Most of the design layouts are consistent with strict navigation use [14]. Even it is the same for building WBA which design according to specifications; the design features in web context are more dynamic and flexible. The key challenge is that it plays an important role in attracting more users and engaging more clients for seizing business opportunities. As there are many competitors outside the globe with their WBA placed on the Internet, the design features when building WBA should be more competitive and compelling [14].

A well site-navigated of WBA benefits web users to obtain desired information in faster and easier way [11][8][28]. Furthermore, the web developers should concern not only with the information content, but the attractiveness, pluralistic design of WBA and valid hyperlinks for effective navigation [14].

Multiple Programming Capability

In conventional software development, the number of the programming language use is very small. A focus to a single or two types of programming language is seems much easier and if mastered, might lead the developer to become an expert. Object-oriented methods, languages and CASE tools might be required for best practices for developing software application [14].

However, the key challenge in building WBA is that the web developers should have the capability to well-verse with a quite number of programming languages and platforms [14]. This is because WBA can be accessed via various platforms that require proper programming languages so that WBA can perform effectively. It applies client-side and server-side architecture that involves interaction between front-end and back-end component [7]. In addition, as web technologies are rapidly grow, web developers should also have the capabilities of learning new languages to cope with the current technologies [24].

Application Visible

The conventional software application can only be visible to the people who use that application because the application is setup and install on site. The development for such application is very specific and visible to the users who owns it or use

it for a particular purpose [23]. For example, an organisation provides a time management system where its employees can keep a track of the time. This means the system is visible only to the employees of that organisation.

Unlike web-based business applications that are develop purposely to make it visible worldwide. It does not mean that if the application can be accessed globally, it also can be visible too. This is one of the key challenges for web developers to make the WBA visible to users who search for a particular term and relevant WBAs appear on the search result. To achieve this, there is one technique namely search engine optimisation (SEO) [20] that help businesses to be on the top of web searched result. An example of a business that sells personal computer online, those organisations's business will be listed on the first list of the searched result when a web user searches for a personal computer by using keywords or phrases in meta-tags and relevance of links from external sites to target site [13][20]. Moreover, if the WBA need to be updated after changes or improvement been made, the actions can be done remotely with authentication elements.

Clients Involvement

Principally, during the conventional software development, the clients' involvement is only at certain stages of SDLC such as during requirements gathering, during requirements analysis and during testing activities only. The clients does not involve with rest of SDLC stages. But, if there is changes in the requirements and if the development has already started, the developer somehow needs to go back to the requirements gathering and analysis stage to update the requirements and then necessary codes need to change according to new specifications [23].

This is different to web-based business development where the clients involvement is at each stage of WDLC. The clients provide feedback on the scope, clarification of the requirements [17][19] and ultimately the clients make all the decision whether the development of WBA needs to proceed. The feedbacks are normally the change request where small development iteration within each stage of WDLC is perform to tackle problems until WBA is complete [23]. At the end of the day, this would produce more effective and accurate applications. Having close involvement with clients are important for gaining their immediate feedback and clarification throughout the building of WBAs but then the communications with clients is one of the key challenges where dealing with clients is a very difficult task.

Multi-Development Practices

Developers in conventional software development have a specific job and the focus is usually on one software application to develop as well as belong to a specific stage of SDLC [23]. For example, a designer is designing a user interface of a software application at the design stage. Whereas, web developers that build WBA face a great challenge which they have given a number of web projects to build and it is not necessary belong to a specific stage of WDLC when building WBA but across the development process [19]. The reason for this is that when building WBA, the functions, modules or components can be reuse and able to customise easily which allow faster development of WBA.

Accessibility and Compatibility Platform

A conventional software application has its own platform to access it which develops uniquely based on requirement specifications. Normally, the platform is a windows-like interface for user to access it and it is develop according to where the application resides [21]. For example, if the software application is windows-based than the user interface is developed for windows and there is compatibility issue with other platform such as Mac and Linux.

Unlike software application, WBA is built on the Internet platform which is compatible with all operating system platforms. This is because the only platform to access WBA is through a web browser. There is a number of web browsers available such as Internet Explorer and Mozilla Firefox. Thus, the key challenge for building WBA is to cater multiple web browsers that allow WBA to be accessed in various web browsers if not all, the famous ones [18]. This means simply that WBA should be compatible to be accessed in different web browsers. The reason is that each web user has its own preferable of using web browsers [5][3].

CONCLUSION

Web-based business applications as platform used greatly for communication between people and business. This paper discovers WBA development key challenges through comprehensive literature about WBA development processes with adapted WDLC. Four WDLC stages for WBA that should be followed are; requirements, design, implementation and operation. Based on the identified WBA development processes according to the WDLC stages, we found that there are six key challanges for building WBA for businesses namely; concurrent accessibility,

unique design features, multiple programming capability, clients involvement, application visible, multi-development practices and accessibility and compatibility platform.

Building effective web-based business applications is vital due to the appearance on the web which allow many web users easy to access as long as a computer has a web browser and an Internet connection. This may affect the performance and user experience in using or accessing these applications and the key challenges presented in this paper therefore, are important for web developers to consider to build better web-based business applications. Further study is required to identify issues faced by web developers specifically and web development team generally, in terms of information management and quality aspects of WBA development process.

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