

A Framework for Enhancing Mobile Development Software for Rangsit University, Thailand

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Abstract—This paper presents the development of a mobile application for students at the Faculty of Information Technology, Rangsit University (RSU), Thailand. RSU upgrades an enrollment process by improving its information systems. Students can download the RSU APP easily in order to access the RSU substantial information. The reason of having a mobile application is to help students to access the system regardless of time and place.

The objectives of this paper include: 1. To develop an application on iOS platform for those students at the Faculty of Information Technology, Rangsit University, Thailand. 2. To obtain the students' perception towards the new mobile app. The target group is those from the freshman year till the senior year of the faculty of Information Technology, Rangsit University.

The new mobile application, called as RSU APP, is developed by the department of Information Technology, Rangsit University. It contains useful features and various functionalities particularly on those that can give support to students. The core contents of the app consist of RSU's announcement, calendar, events, activities, and e-book. The mobile app is developed on the iOS platform. The user satisfaction is analyzed from the interview data from 81 interviewees as well as a Google application like a Google form which 122 interviewees are involved. The result shows that users are satisfied with the application as they score it the most satisfaction level at 4.67 SD 0.52. The score for the question if users can learn and use the application quickly is high which is 4.82 SD 0.71. On the other hand, the lowest satisfaction rating is in the app's form, apps lists, with the satisfaction level as 4.01 SD 0.45.

Keywords—Mobile application, development of mobile application, framework of mobile development, software development for mobile devices.

I. INTRODUCTION

IN the past five years, the emergence of the mobile devices has changed the way of life. A Smart phone is not only just a communication tool; it also comes with useful mobile applications that allow the access to the internet at anytime and anywhere. It becomes a high demand for an organization as it should be ready for the need of mobile-cross platform development. For this reason, many organizations increasingly use mobile phone devices to access business-related apps. In addition, the benefits in expanding the business apps among enterprises become significant to the business as it can be seen that organizations can rapidly develop and deploy apps cross different platforms. The mobile app development has become more important over the coming years. With these reasons, the Department of Information Technology at Rangsit University

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(RSU) has initiated a project to develop a mobile application that enables IT students to serve their mobility needs. RSU is a leading private University in Thailand with 32 faculties and 36,000 students at the main campus. The RSU's policy is to giving free Tablets to the first-year students. Students who own smartphones can visit an iOS app store and download a mobile application called "RSU APP", and then install it on the mobile devices. They can choose to see all programs including the admission, or e-book. RSU also has the web application that involves administrative functionalities such as Human Resource, Finance and Accounting, Budgetary, Registration and Enrolment, and Campus Dormitory. Students can use a web application called "Intranet"; this helps them on enrolment and registration online. However, there is a high demand in using mobile applications, which is an alternative choice for students these days. The most important purpose for mobile development is to deploy applications to all users. Mobile application store such as Apple's App Store develops its application distribution method to ease mobile devices to access. This app store helps users to easily reach others hundred thousands of mobile users with no investment cost to the developers.

This paper is focused on developing mobile application for students or anyone who are interested in RSU's news and activities. It also helps to developers to figure out and plan future mobile application development. Surveys and interviews are conducted with the RSU students who study at the Faculty of Information Technology. They give significant feedback in terms of user perspectives, and important procedures in return.

II. METHODS AND PROCESSES

A. Mobile Application Development

Dynamic System Development Method (DSDM) is introduced in this paper as it is widely accepted in IT industries for carrying out business projects successfully within the timeframe [10]. It is illustrated in Fig. 1. The main purposes of DSDM are building a rapid prototype and empowering users in decision-making. DSDM framework leads the life cycle development in relations to re-designing a prototype to be more flexible. Users can give their suggestions throughout the development. This is useful to the new design as it is closely resembled to the real business needs.

1. Pre-Project

The Pre-Project phase includes project suggestion and selection of the proposed projects. The pre-project determines if a project should be realized or not.

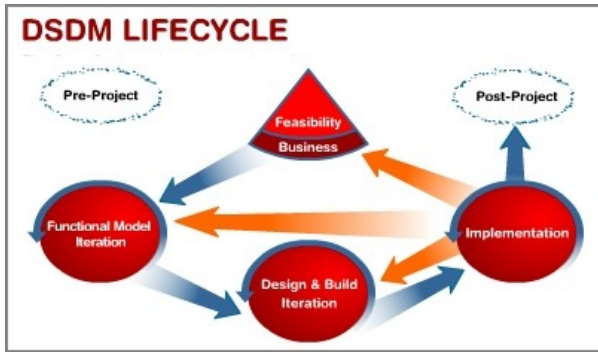


Fig. 1 Dynamic System Development Method (DSDM)

2. Feasibility Study

Considerations in a Feasibility Study consist of definition of the problem to be addressed, assessments of the potential costs and technical capability concerning a computer system aimed to solve business problems. The concept of mobile device development for IT students has been researched for almost 2 years by the management of the department of Information Technology, Rangsit University. An outline statement in regards to the requirement has been executed by the developers. It is essential for the feasibility study in this paper. It is agreed that the current website application does not fit the real business needs though.

3. Business Study

Having decided in the Feasibility Study that DSDM is an appropriate method framework, the Business Study provides the basis for all subsequent work. Like the Feasibility Study, it is to be as short as possible (the duration is measured in weeks rather than in months), while achieving in sufficient understanding and requirements. The new mobile app is supposed to integrate data from RSU's existing application. This process takes time for developers to prepare detail of functional requirements and non-functional requirements on the operation workflow.

4. Functional Model Iteration (FMI)

The focus of Functional Model Iteration is to define the business-based aspects of the computer system, i.e. building the high-level processing and information requirements identified during the Business Study. The users are frequently involved in defining the contents and the function of the prototype screen.

5. Design & Build Iteration (DBI)

The Design and Build Iteration is where the computer system is engineered to a sufficiently high standard that is to be securely placed in the hands of users. This stage is concentrated on completing functional requirements and potential technology that meet the business requirements

6. Implementation

The Implementation phase covers from the developmental environment to the operational environment. This stage is conducted to prepare for the user acceptance test.

7. Post-Project

Post-project tasks include measurements on how the deployed system is performed and if any further upgrade is required. Usually such measurement takes place about 6 month after the project is technically finished.

Similar to the Rapid Prototype Development (RAD), the method can be combined with the standard DSDM as part of the development cycle such as project management, quality assurance, and software testing. RAD does not have a method to produce systems under a time constraint. DSDM does not provide new development technique like entity or state transition diagrams.

Fundamentals of Application Development

This study addresses on the important concepts in iOS application development in order to understand the iOS design pattern and its basic concepts. Design pattern is iOS applications following the MVC design pattern as follows;
 A.) Model: Represent the business logic of an application
 B.) View: Represent what the user sees in the device.

An Application Development Framework

iOS Framework is a free and open-source mobile HTML framework. It is used to develop hybrid mobile apps or web apps by the use of iOS & typical Android. It is also an indispensable prototyping apps tool aimed to show app prototype in an instant manners.

The main approach of the iOS Framework is to give an opportunity to clearly and easily create iOS & Android apps with HTML, CSS, and JavaScript. It offers ways of possible solutions somehow. However, it is not compatible with all platforms. It is focused merely on iOS and Google Material design that brings the best experience and easy to use. It is shown in Fig. 2.



Fig. 2 iOS Framework

iOS Framework definitely builds iOS or Android hybrid app (PhoneGap) or web app that look similar to a typical iOS and Google Material apps. To create iOS apps using a framework is as easy as website creation. A simple HTML layout and attached framework to CSS and JavaScript files are required. There is no need to write custom tags that need to be converted by JavaScript to something else. No need to write and describe all contents in JavaScript (or JSON), just plain HTML. It always gets exactly the same results as when

writing in the HTML.

B. Deploy RSU app on Apple's Store

iOS has an application distribution that helps iOS developers to deploy their application on Apple's store more efficiently. There are three major steps needed to be followed. First, enrolment of the subscribers' names via Apple store is necessary. Second, once the developer has to develop an app and complete the testing, he/she needs to create the app record in this development stage. Understanding the new tools and distribution process helps to get the new app updated and released to users faster. Yet, before distributing the app to the apple store for testing, approval is required. Lastly, submitting the new app to the apple store is to be carried out, signing into the iTunes Connect to create an app record and enter necessary information are required. The purpose is to check if anyone is selling the illegal app on the apple store. Once getting distribution certificate, the system will allow uploading the new app. The iTunes Connect submits the new app to the apple store, and in this step, users can set the date of when the app will be available to them.

C. Create Survey Form

Questionnaires [1], [2] are collected scientifically and systematically. It can be measured by what the researcher wants to assess through a representative sample of the target population. This is to obtain the facts of the past and the present data, while future events can be predicted. The questionnaire contains questions to elaborate many aspects about opinions and facts. Questionnaires are used randomly on the survey target, who is the current students in various academic years in the Faculty of Information Technology. There are two ways to distribute questionnaire; by using traditional survey form and by using electronic survey form such as Google Form. A volunteer group has collected data. In building a questionnaire, a major concern is to come up with important questions substantial for a research. This is because the researcher who creates a questionnaire might not have an opportunity to actually meet the respondents and explain the exact meaning of the questions in the questionnaire. Data collection is done by an interview or by asking respondents questions through a questionnaire and the data obtained from Google form. The questionnaire is focused on two major areas as follows;

1. General Information: RSU App has consisted of student's personal information such as sex, age and year of study.
2. Details of Information involves RSU App and its usability;
 - Understanding how to use the RSU App and the installation processes
 - In general use of RSU App
 - Key features and image of the RSU App

D. Statistical Analysis and Interpretation

Statistics used in this research comprise the sample of arithmetic mean (Sample Arithmetic Mean) and the sample of average standard deviation (Sample Standard Deviation).

III. RESULT AND DISCUSSION

RSU app contains eight main functionalities; list of screen functionalities can be seen below; (see Fig. 3)

1. Program: Program help users to see all of the programs opened in each semester. This includes graduate and undergraduate programs
2. Admission: Admission helps students who are interested in a particular program to apply via the online application form
3. Intranet: Intranet is used for RSU's personnel and students to access their personal information
4. News: News on all RSU activities.
5. Calendar: Calendar displays all RSU activities in a calendar form, such as the beginning and the end of enrollment period, or examination date.
6. Ebook: Ebook is a source of information for students to access academic content that is provided in an ebook form
7. Q&A: Q&A is provided in two-way communication channels
8. Map: Map illustrates a building map and location of the entire RSU campus.

The result from the survey as shown in Table I represents the result from the data review that is derived from two sources of RSU App. Firstly from the survey, the researchers distribute surveys to over 100 copies and they are returned to researchers. Secondly, the data can be analyzed from 41 people who used the Google form. Satisfaction surveys are sent out in the e-mails of the selected 100 people and then they return the feedback. Data can be analyzed from the responses of survey that respondents for 103 people in total join. Male is accounted for 77.67 percent of the total respondents, whereas Female is accounted for 23.33 percent. The majority of students who complete this survey is the first-year students containing for 29.13%, the rest of the students are varied as follows; 2nd year student: 23.30%, 3rd year student: 23.30% and 4th year student: 24.27%.

TABLE I
 ANALYZE QUESTIONNAIRE DATA

| Gender | Survey form | Google form | |
|----------------------|-------------|-------------|-------------|
| Male | 32 | 48 | 77.67% |
| Female | 9 | 14 | 23.33% |
| Total | 41 | 62 | 100% |
| Student Years | | | |
| 1 st | 14 | 16 | 29.13% |
| 2 nd | 9 | 15 | 23.30% |
| 3 rd | 9 | 15 | 23.30% |
| 4 th | 9 | 15 | 24.27% |
| Total | 41 | 62 | 100% |

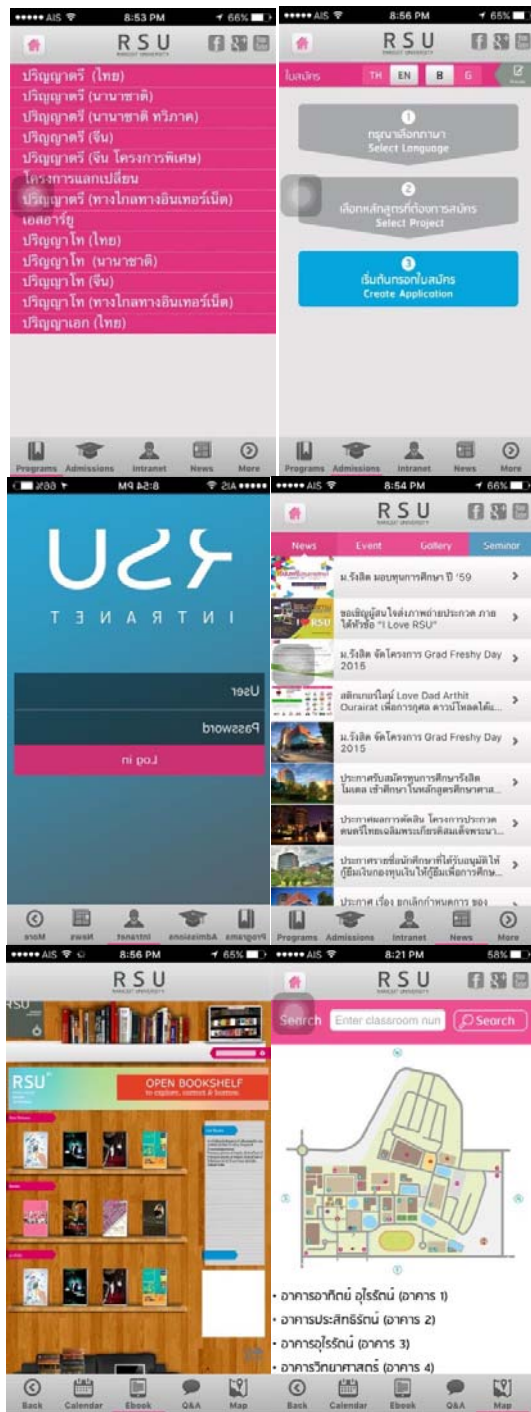


Fig. 3 Iteration Screens

From the satisfaction survey, on the 2nd topic, which contains the details about the various aspects of the RSU app. [3]-[5] is the level of performance and quality (Rating Scale). The results of the survey terms of installation process and an understanding of the app use are given the highest satisfaction level or 5. These results suggest that end users can learn and quickly use the app, the average score is 4.82 SD 0.53. The installation applications process and the applications are all easy and affordable to execute, with an average score of 4.74

SD 0.61. Furthermore, users can understand and use the applications quickly as they give the average score of 4.50 SD 0.45. The satisfaction results in this section are relatively higher than the average rating. Possibly, it is due to the pattern details in each module of the application. This is similar to a web page. Thus, users are already accustomed to the topics, as they are satisfied with their interest level in Apple applications. The modern form of the application also concerns functionality.

Users have realized that on the topic of “more” which has shown decline in figure from the highest value is 4.18, SD 0.62 and 4.01 SD 0.45 respectively.

This is because those are surveyed, and formed like a trendy bright color than it is supposed to be. Researchers consider that the RSU APP Phase II will be developed to suit the age and the style of the users.

In terms of style and image, they consist of three sub-topics that users have a comment in terms of the "high" level 3, from the highest rating to the lowest; appropriate form of letters within the applications and the size of the letters and iOS applications. These have colorful characters and iOS applications on. The average scores are 4.13 SD 0.43, 4.07 SD 0.65 and 3.87 SD 0.89 respectively. The satisfaction in this section is not relatively high. This is probably due to the look and feel of the app that is based on a Web page. The majority of users are teenagers. Therefore, the app should be created to look beautiful and modern. The final work consists of five sub-opinions. The "highest score" is 5. The topic is regarding the satisfaction on the application functionality.

The average score is 4.67 SD 0.52. This number shows a pattern of descending in average. The user is satisfied with the application functionality, which facilitates an access to information from the university; application functionality is useful to users and applications. Applications can run properly. The average score and the SD are 4.65 SD 0.43, score 4.44 SD 0.43 and the score 4.38 SD 0.50. Satisfaction results are higher than those in every topic. This number reflects survey respondents that the importance of RSU app is developed.

There is a possibility that in the future a number of users accessing the RSU app will be augmented. In addition, survey respondents have found the app being able to provide additional comments and suggestions for future app development; app seems to conclude the use of other details. For example, students can check their grade for enrolment, payment of registration, or view the University calendar. Students also need to have an app that shows their personal information (User Profile) [6]-[9] as well as a student's scheduled timetable. The satisfaction data are shown in various fields. As a result, the researcher can find such valuable data which create ways to improve the app for students, staff and maximize the convenient use in the future.

IV. SUMMARY

This research paper demonstrates a good framework for developing of RSU App that can provide easy way to access information from Rangsit University. Apparently, the result

from this paper has shown the efficiency of the app use that the university should keep developing RSU app in further stage. This helps to facilitate usage behavior of users and continue enhancing a new advance in IT today. Conversely, it is necessary to address a proper design and functionality for RSU's students and personnel.

From this study, it is realized that a number of students who use mobile devices have been increased dramatically in the past few years. RSU should be prepared for Mobile Device Management (MDM). This assists RSU management to deploy and enforce IT policies to user's mobile on campus.

In addition, students need an easy way to access information to choose classes in the timetable that is provided by the University. As a matter of fact, a mobile application creates a social community and gives support in two-way communication between RSU and students. However the traditional website application is still adequate at present. RSU should concern insufficient equipment to meet the demand for mobile app due to budget and resourcing limitations, skills gap, legacy infrastructure, overall technology fragmentation and immature lifecycle workflows.

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