Experience in Usability Testing of Web Application System

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Abstract—Based on [1] [2] [3] MIMOS Berhad Test Team has adopted a specific testing method to manage and implement the usability testing activities for a Web application project. The method is known as usability heuristics guidelines originally defined by Jacob Nielsen in 1994. The usability testing focused on the data entry part of web application. It was based on qualitative assessment of how easy the system was to use. The objective was for the user to have the best user experience and support users in achieving their goals quickly and easily by using the system.

Keywords—Usability Testing, Usability Evaluation, Heuristic Evaluation.

I. INTRODUCTION

Testing was carried out using the application business flows by focusing on critical and frequently used functionalities of the system. The aim of the usability evaluation was to ensure crucial usability problems are stressed out and rectified before the system was launched. The usability testing started in the early phase of the project before the system was accepted by the user in the User Acceptance Test phase. This paper explains some of the experiences in conducting usability testing specifically on usability evaluation by applying Nielsen’s heuristics method.

II. METHOD USED

Testing was conducted in 2 different cycles. First cycle was conducted by in the internal testers from the project team. Second cycle was conducted by the Subject Matter Experts (SMEs) from the client side.

The testing was conducted in a separate room in presence of SME and the tester as an observer. The SMEs were assigned with the test scripts to execute. The role of the observer was to monitor behaviour of the SMEs and report outcome of testing. In the session both SMEs and observers were present in same physical location.

III. TESTING PROCESS

Usability testing process went through the following phases. The goal was set, to ensure any potential issues were highlighted and fixed before the system was launched.

Test coverage, testing types, test environment, test schedule and test responsibilities were defined in the Test Plan during the Test Planning phase. Test team conducted a walkthrough session with the SME to explain the approach that will be used for testing. Creating and writing test cases started in the Test Design phase. 2 different sets of Test Cases were designed. Detailed approach will be explained in the next section. Test execution were performed by Tester from the Project Team in cycle 1 and by SME in cycle 2. The result and the feedback from the test execution phase was analysed in the Result Analysis phase. Test Summary Report was prepared in the Reporting phase.

A. Testing Planning

During the test planning, we concentrated on these objectives [4].

1. What should be tested?
2. How should be tested?
3. Which module and feature must be tested?
4. What should not be tested?

Test planning or preparation for cycle 1 focused on these parameters [8]:

i. Effectiveness
ii. Efficiency
iii. Accuracy
Test planning for cycle 2 concentrated on the following criteria:

i. Critical functionality
ii. How many modules

B. Test Design

Tests scripts for Usability System Test cycle 1 was organized into different sections based on the parameters that were defined in the planning phase. Test cases were segregated into:

1. Effectiveness
   i. Content
   ii. Color
   iii. Icons
   iv. Images
   v. Fields
   vi. Button
   vii. Message
   viii. Alert
   ix. Exception

2. Efficiency
   i. Page Format
   ii. Navigation
   iii. Scroll Bar

3. Accuracy
   i. Data Integrity
   ii. Links
   iii. Provision to search

Test scripts used for usability evaluation for cycle 2 were designed based on the functionality and scenario. This was to ensure the system features and functionalities have been designed based on the user needs and preferences.

Two different approaches were used in performing the usability testing. They were planned and conducted from different perspectives. Cycle 1 test execution was performed by the internal tester from the project team. The objective in cycle 1 was to obtain technical feedback against the predefined parameters. Test cycle 2 execution was performed by the SME of the system in order to get true feedback on the system from the user perspective.

C. Test Execution

System test execution for both cycles were conducted on the Staging environment. Sanity Test was done prior to the test execution by the SMEs.

Test execution consisted of executing the test scripts that were created in the Test Design phase. Input to the test execution included:

i. Test coverage walkthrough
ii. Test Scripts
iii. Test Data

Test Scripts consisted of instructions that are performed on the system under test to verify the system functions as expected. The test scripts were executed. The test outcome was considered as the actual test result. The actual test result was compared with the expected test result.
If the values were the same, the SME recorded the test result as pass otherwise SME recorded the test result or test execution status as fail. The execution process was shown in sequential as per Figure (3). In certain case it was carried out iteratively with same test scripts or test instruction.

As specified in [2], separate documents were produced in each stage of testing. The output to the test execution was:

i. Test Log - Testing Acknowledgement
ii. User Feedback List.

Test Log or Test Acknowledgement comprise of a name of what project was undergo the testing activities, which phase, venue where the testing execution took place, which components and tests scripts were run, who ran the tests, from which organization, in what order they were run, and whether or not individual test was passed or failed and the signature.

D. Result Analysis

Feedback from SMEs were captured in the feedback list in Excel format. Tester mapped them accordingly with [6] the 10 usability heuristics originally defined by Jacob Nielsen in 1994.

<table>
<thead>
<tr>
<th>No.</th>
<th>Heuristic Evaluation of User Interfaces [6]</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Visibility of system status</td>
</tr>
<tr>
<td>2</td>
<td>Match between system and the real world</td>
</tr>
<tr>
<td>3</td>
<td>User control and freedom</td>
</tr>
<tr>
<td>4</td>
<td>Consistency and standards</td>
</tr>
<tr>
<td>5</td>
<td>Error prevention</td>
</tr>
<tr>
<td>6</td>
<td>Recognition rather than recall</td>
</tr>
<tr>
<td>7</td>
<td>Flexibility and efficiency of use</td>
</tr>
<tr>
<td>8</td>
<td>Aesthetic and minimalist design</td>
</tr>
<tr>
<td>9</td>
<td>Help users recognize, diagnose, and recover from</td>
</tr>
<tr>
<td></td>
<td>errors</td>
</tr>
<tr>
<td>10</td>
<td>Help and documentation</td>
</tr>
</tbody>
</table>

6 SMEs were involved in the system test execution. Figure below shows the number of usability feedback that had been gathered from each SME for the session.

Figure 3 No. of Feedback from SMEs

The highest number of feedback were gathered for heuristic criteria number 7; Flexibility and efficiency, followed by criteria number 4; Consistency and standards, then, criteria number 2; Match between system and the real world, and criteria number 6; Recognition rather than recall. Graph below shows the number of feedback by heuristics criteria.

Figure 4 No. of Feedback by Heuristic Criteria
Based on the usability heuristics criteria, 28% of the feedback from the SMEs were related to the Flexibility and Efficiency of Use, 27% for Consistency and Standards, 14% for Match System and Real World, and 13% feedback was related to the Recognition rather than Recall. The Pareto chart shows 4 criteria, which is criteria 7, 4, 2 and 6, contributed to 80% of the feedback.

Further actions have been identified from the test result and the gathered feedback. Criteria 7, 4, 2 and 6 were the top 4 of criteria that need to be addressed in designing the Web application for the subsequent projects. These feedback and actions have helped project team to identify and focus on those areas in other upcoming and future projects. Besides, the Development team could apply this result to recapitulate the criteria as a main focus in the Implementation phase.

At the end of the test execution with SMEs, a review session was conducted. This session involved SMEs, Business Analyst, Technical Team and Tester. The team went through each of the feedback gathered and discussed in details. Each feedback was categorized accordingly whether it was problem report, improvement or change request. Problem report is a problem which impairs or prevent the functions of the system. Improvement is an enhancement to an existing feature or task and change request is a system change that has significant impact to the project.

E. Reporting

Test Summary Report was prepared determine whether the system conform to the requirements and satisfies the user needs. Report consisted of test execution result including incident which was problem report that occurred, the improvement and change request from the user feedback list.

The report was the final document used to determine if the system being tested was viable enough to proceed with the next stage of acceptance test by the User.
F. Conclusion and Future Work

In this work, we have described the approach to conduct usability test on Web application. User involvement at the early stage would receive much higher usability view and criticism which lead the Project team to deliver usable systems. In summary, our approach of conducting usability testing as described above has helped us in the following areas:

1. Heuristic evaluation helps to uncover many major usability issues in the earlier stage and in a short period of time
2. Each type of testing discovers a different set of problems
3. Evaluation gather true feedback from SMEs who is the user of the system
4. Improve user satisfaction

In future, we are planning to extend this approach to the related web applications that undergo the testing. In additional we are planning to implement the [4] comparative usability testing which focuses on evaluating 2 or more products specifically for the projects that are related to the public Web sites. This is by reviewing which Web site provides better visibility. It is useful to have variant views which will provide better users’ experience towards the design of a Web site.

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REFERENCES


