CASE STUDY CUG BIM: BETTER DELIVERIES TO THE END USER IN SOFTWARE PROJECTS WITH THE USE OF A MODEL OF USABILITY TESTS

ESTUDO DE CASO CUG BIM: MELHORES ENTREGAS PARA O USUÁRIO FINAL EM PROJETOS DE SOFTWARE COM A UTILIZAÇÃO DE UM MODELO DE TESTES DE USABILIDADE

Hugo Almeida*

ABSTRACT

The Project CUG BIM, developed by the Institute Senai of Innovation for Information and Communication Technologies, has been interfered with from the point of view of process and has become an essential case study for this research. The focus of this research was the way the project was tested on point of view of usability resulted in considerable benefits for the team of participating developers and the client. It was possible to extract data that prove the positive results of the use of the model of usability tests used after the process of development of the proposed project. All stakeholders involved in the CUG BIM project obtained advantages related to their area of action with the actions performed and reported by this work, and all these actions together form an specialy adapted model to this project. The proposal was based on scientific concepts well defined and diffused in academy and industry.

Keywords: Human-Centered Design. Software tests. Usability tests.

RESUMO

O Projeto CUG BIM, desenvolvido pelo Instituto Senai de Inovação para Tecnologias da Informação e Comunicação, sofreu interferência do ponto de vista do processo e se tornou um estudo de caso essencial para esta pesquisa. O foco desta pesquisa foi a forma como o projeto foi testado do ponto de vista de usabilidade, o que resultou em benefícios consideráveis para a equipe de desenvolvedores participantes e para o cliente. Foi possível extrair dados que comprovam os resultados positivos do uso do modelo de testes de usabilidade utilizado após o processo de desenvolvimento do projeto proposto. Todos os atores envolvidos no projeto CUG BIM obtiveram vantagens relacionadas à sua área de atuação com as ações realizadas e relatadas por este trabalho, e todas essas ações juntas formam um modelo especialmente adaptado a este projeto. A proposta foi baseada em conceitos científicos bem definidos e difundidos na academia e na indústria.

Palavras-Chave: Design Centrado no Homem. Testes de software. Testes de usabilidade.

* Centro de Estudos e Sistemas Avançados do Recife. Brazil. Pesquisador Industrial do Instituto Senai de Inovação para Tecnologias da Informação e Comunicação (ISI-TICs). hugolnalmeida@gmail.com

Introduction

The platform developed in this project is a WEB system that inserts in the market the CUG (Cost Unitary Geometric) method, which provides accurate estimates of the cost of constructing buildings from preliminary project information, with BIM modeling [1].

In addition to the pilot model, the CUG Calculator will be able to support plug-ins that have interaction with the calculator itself. A model in the Sketchup model is an example that allows to extract geometric characteristics of the enterprises directly from the models drawn in the program [2]. The plug-in, titled CUG BIM, is a Sketchup project that was started with the goal of interacting with the CUG, if fed from its database [3].

The CUG BIM screens were developed in parallel to the development of CUG and passed usability tests with satisfactory results for ISI-TICs and for this research, since it was also managed through Scrum [3].

This document describes a model adapted for usability testing. The objectives of the usability test were defined following the logic of Test Plan in [4]:

• Determine design inconsistencies and usability issues within the user interface and content areas. Possible sources of error may include navigation errors, presentation errors, and usage control problems;

• Exercise the application or system under controlled test conditions with representative users. The data will be used to access the usability goals and if an effective, efficient and well received user interface has been achieved;

• Establish baseline user performance and satisfaction levels of user interface users for future usability assessments.

After reviewing this usability test plan, including the preliminary task scenarios and usability goals for the CUG BIM system, documented plan acceptance is expected.

1 Methodology

This section briefly describes the role of participants, the configuration of usability testing sessions, the tools used to facilitate participant interaction with the application (for example, sketchup) and the measures to be collected, such as demographic information, satisfaction and suggestions for improvement.

1.1 Participants

Participants needed to complete a set of representative task scenarios presented in a form and provided feedback on the usability and acceptability of the interface. Participants were directed to provide honest reviews on the usability of the application and to participate in subjective questionnaires and post-session briefing.

In addition to the test participants (a developer of innovation and technology and an industrial researcher) who performed the tests, the following roles are fundamentally highlighted [5]:

Coach. The coach should provide training overview prior to the usability test;

Facilitator. The facilitator should provide participants with an overview of the study, define usability and purpose of usability testing for participants, assist in conducting participant and observer debriefing sessions, and respond to participants' attendance requests.

Data logger. Record participant actions and comments.

Test takers. Silent observer, assists the data logger in identifying problems, concerns, coding errors and procedural errors. They should serve as note takers.

All persons involved with the usability test are required to adhere to the following ethical guidelines. The performance of any test participant should not be individually attributable. The name of the individual participant should not be used in a reference outside the test session. Just as a description of the participant's performance should not be reported to his manager.

1.2 Procedure

In the proposed model, the participants of the test participated in the usability test in a common computer that supports the execution of Sketchup, within a typical office environment. The participant's interaction with the application is monitored by the facilitator sitting in the same office. Note-takers and data loggers monitored the sessions in the observation room.

The facilitator informs the participants of the use of the application and instructs the participant who is evaluating the application, not the facilitator who evaluates the participant. Participants enter an informed consent they acknowledge: Participation is voluntary, participation may cease at any time and the session will be observed, but their

privacy of identification will be safeguarded. The facilitator asks participants if they have questions.

Participants will complete a demographic and pre-test background questionnaire. The facilitator will explain that the amount of time needed to complete the test task will be measured and that the exploratory behavior outside the task flow should not occur until after the task is completed. At the beginning of each task, the participant will read aloud the job description of the hard copy and start the task. The measure of time in the task begins when the participant starts the task.

The facilitator will instruct the participant to "think out loud" so that there is a verbal record of their interaction with the application. The facilitator will observe and enter user behavior, user comments, and system actions in the data logging application.

After each task, the participant will complete the task session document with the facilitator. After all task scenarios are attempted, the participant will complete the post-test satisfaction questionnaire.

Participants can also participate in the usability test via remote screen sharing technology. In this situation, the participant will be sitting at his workstation in his work environment. Verbal communication will be supported by telephone.

The facilitator will inform the participant and instruct that he or she is evaluating the application, rather than the facilitator who evaluates the participant. Participants will complete a demographic and pre-test background questionnaire. Sessions will begin when all participants' questions are answered by the facilitator. The facilitator will inform the participant that the time-on-task will be measured and that the exploratory behavior outside the task flow should not occur until after the task is completed.

The facilitator will instruct the participant to read aloud the job description of the printed copy and begin the task. The time-on-task measurement will begin. The facilitator will encourage participants to "think out loud" and there will be a verbal record of the interaction of the task system. The facilitator will observe and enter user behavior and feedback and system interaction in a data logging application.

After each task, the participant completes the task session document. After all the tasks have been attempted, the participant will complete a post-test satisfaction questionnaire.

2 Usability tasks

Usability tasks were derived from test scenarios developed from use cases and the assistance of a subject specialist. Because of the scope and breadth of functionality provided in the application, and the short amount of time for which each participant will be available, tasks are the most common and relatively complex available functions. The tasks are identical for all participants of a given user role in the study.

Job descriptions should be reviewed by the application owner, business process owner, development owner, and / or implementation manager to ensure that the content, format and presentation are representative of actual use and substantially evaluate the total application.

2.1 Usability metrics

Usability metrics refer to measured user performance against specific performance goals required to meet usability requirements. Success rates for scenario completion, adherence to dialog scripts, error rates, and subjective ratings will be used. Scenario completion time will also be collected.

Completion of the scenario. Each scenario will require, or require, that the participant obtain or enter specific data that would be used in a typical task. The scenario is completed when the participant indicates that the goal of the scenario has been achieved (successfully or without success) or the participant requests and receives sufficient guidance to justify classifying the scenario as a critical error.

Critical errors. The critical errors are deviations in the completion of the targets of the scenario. Obtaining or denying the incorrect data value due to the participant's workflow is a critical error. Participants may or may not be aware that the purpose of the task is incorrect or incomplete.

Critical errors can also be attributed when the participant initiates (or attempts to initiate) and action that will result in the impossibility of the goal. In general, critical errors are unresolved errors during the task completion process or errors that produce an incorrect result [6].

Non-critical errors. Non-critical errors are errors that are recovered by the participant or, if not detected, do not result in processing problems or unexpected results. Although non-critical errors can be detected by the participant, when they are detected,

they are often frustrating for the participant. These errors can be procedural, in which the participant does not complete a scenario in the ideal media (for example, excessive steps and keystrokes). These errors can also be mistakes of confusion [6].

Subjective evaluations. Subjective assessments of ease of use and satisfaction will be collected through questionnaires, and during debriefing at the conclusion of the session.

Scenario Completion Time (time on task). The time to complete each scenario, not including the subjective evaluation durations, will be recorded.

2.2 Severity of problems

To prioritize the recommendations, a method of rating the severity of the problem will be used in the analysis of the data collected during the evaluation activities. The approach treats the severity of the problem as a combination of two factors: the impact of the problem and the frequency of users facing the problem during evaluation [7].

Impact. Impact is the ranking of the consequences of the problem, defining the level of impact that the problem has on the successful completion of the task [7]. We highlight three levels of impact:

• High - prevents the user from completing the task (critical error);

• Moderate - causes user difficulties, but the task can be completed (non-critical error);

• Low - Minor issues that do not significantly affect task completion (non-critical error).

Frequency. Frequency is the percentage of participants who experience the problem while working on a task [7].

• High: 30% or more of participants experience the problem;

• Moderate: 11% - 29% of participants experience the problem;

• Low: 10% or less of participants experience the problem.

Severity rating of the problem. The severity identified for each problem implies a general reward for its resolution and an overall risk for not addressing it in the current version [7].

• Severity 1 - High impact problems that often prevent a user from completing a task correctly. They occur at varying frequencies and are characteristic of calls to the help

desk. Reward per resolution is typically displayed on fewer Help Desk calls and reduced reimplementation costs.

• Severity 2 - Moderate to high frequency problems with low impact are typical of erroneous actions that the participant recognizes need to be undone. Reward per resolution is typically displayed in reduced task time and decreased training costs.

• Severity 3 - Moderate problems with low frequency or low problems with moderate frequency; These are small hassle problems faced by several participants. Resolution reward is often required in reduced task time and greater data integrity.

• Severity 4 - Low impact problems faced by few participants; there is a low risk of not solving these problems. Reward by resolution is usually displayed in greater user satisfaction.

3 Results

The usability test report was performed upon completion of the usability test. This is a presentation of the results; with evaluation of usability metrics against pre-approved objectives, subjective assessments and specific usability problems and recommendations for resolution. Recommendations will be categorically dimensioned by development to aid in implementation strategy.

After all task scenarios were attempted, the participant completed the post-test satisfaction questionnaire containing 23 questions. In general, the evaluations were positive in relation to the project and constructive criticism and praise was expressed by the participants.

The team of developers was able to get more motivated through this whole process and to better understand the needs of the project. Furthermore, the work of the developers was the biggest positive result that influenced the gains that the project management had and the final satisfaction the first end user of the System.

In general, ISI-TICs were able to reflect on the results achieved in this research by adopting this usability test model for other projects, and to begin the process of implementing the software testing team at the institution.

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