

## An Interview-based Approach to Elicit User Interface Design for Web applications

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**Abstract.** Elicitation of user interface design for Web applications is a process to gather much precise information from users so that software engineers can design the user interface according to what user wants and needs. There are several issues that related to the user interface design. Thus, the elicitation of user interface design should be done in order to reduce the problem related to the user interface design especially for Web applications such as software engineers misunderstood what user's wishes and lack of information from users about the requirements to design the user interfaces. This research proposes an interview-based approach to elicit user interface design for Web applications. A prototype tool will be developed to help software engineers to elicit the user interface requirements from users precisely.

**Keywords:** Interview-based approach, user interface design, Web applications.

### 1 Introduction

The user interface can be described as interaction from users with any devices such as mouse and keyboard. [1] state that the user interface is the foremost and replaceable components of any software. User interface design (UID) for a Web application in which users will use the Web and what task that should be done on the Website. The eliciting process of UID for a Web application is a process to gather more precise information from the user on which requirement of the functionality of interface design for the Web application that will be developed. This research expects the prototype tool can be used to guide the process of elicitation of user interfaces design for Web applications from users.

UID specifies what user needs in term of look and feel of a software system and what software engineers understand based on user requirements. However, sometimes software engineers develop user interfaces with little or few supports or guidance from professional user interface designers [2]. Besides, UID is a mind boggling process basic to the achievement of a software system such that planning interactive system which is attractive, accessible, and easy to use is a challenging task [3].

The main goal of this research is to propose an interview-based approach to elicit UID for a Web application.

The objectives of this research are:

- i) To identify the issues and current solutions related to UID for Web applications
- ii) To develop a prototype tool that guides software engineers in eliciting UID from users by using the proposed approach
- iii) To evaluate the proposed approach in supporting UID elicitation process

The scope of this study is to focus on UID as one of the requirements in elicitation process. Besides, this study also focuses only on input controls of UID for a Web application. The proposed approach delivers guidance and suggestion to the user to describe what type of the interface design for each category they want to be included in the Web application and to guide the software engineers to understand more about the user's need.

## 2 Related Work

There are limited existing works that use the systematic literature review as their method to review UID issues systematically with different focuses. The work by [4] discusses the attractiveness and learnability factors in Web applications. Besides, [5] also uses systematic literature review as the method to identify the strengths, gaps, and challenges of the related work for the semiotics perception in user interfaces. Moreover, a systematic literature review has also been used to a physical exploration of some related works to identify the criteria and gaps of usability and security in UID respectively [6]. Thus, the systematic literature review in this research aims to gather information about existing works in the UID for Web applications and specifically the elicitation process of UID.

## 3 Methodology

This research is conducted based on the research procedure. Each phase consists of an objective to be achieved in this research. Each objective has a detailed description of the research activities carried out.

The first phase of this research is identifying the issues in UID for Web applications. To obtain the information of the issues regarding on UID, a systematic literature review is used to study the gap in existing solutions in eliciting UID from users. Firstly, this research focused on the concepts of the Web application. Then, the general problems of UID in a Web application were identified. Next, the issues in UID in a Web application were recognized which the end users have a problem to describe their requirements of UID precisely. Lastly, the strengths and weaknesses of the current solutions also been obtained.

The second phase is defining the objectives of this research. This research investigated the related works with UID for Web applications by using the information that already identified in Phase 1. The output of this phase is the list of objectives and a systematic literature review.

The third phase is to propose the approach and prove the concepts using the tool. After the objectives are listed in Phase 2, an interview-based approach is used to make the eliciting in UID for Web applications. Then, a prototype tool will develop to prove the concept of an interview-based in eliciting the UID for a Web application.

The last phase is research evaluation. The evaluation will be conducted by collecting all the data from the respondents using questionnaire. The questionnaire is conducted to prove the way to elicit input controls of UID by using the provided tool, and it will be evaluated by the case study of this research which is the Betatesting group under Syerilmu.com.

## 4 Proposed Work

This study proposes the prototype tool by using an interview-based approach to elicit UID for Web applications. According to [7], "Interviews provide in-depth information pertaining to participants' experiences and viewpoints of a particular topic". This means that the selected approach for this research will gain and elicit information from the user about the UID in input controls elements for the Web application. The provided prototype tool will provide the questions for the criteria that need to be elicited by the user regarding on the elements used in Web applications.

### 4.1 Conceptual Diagram

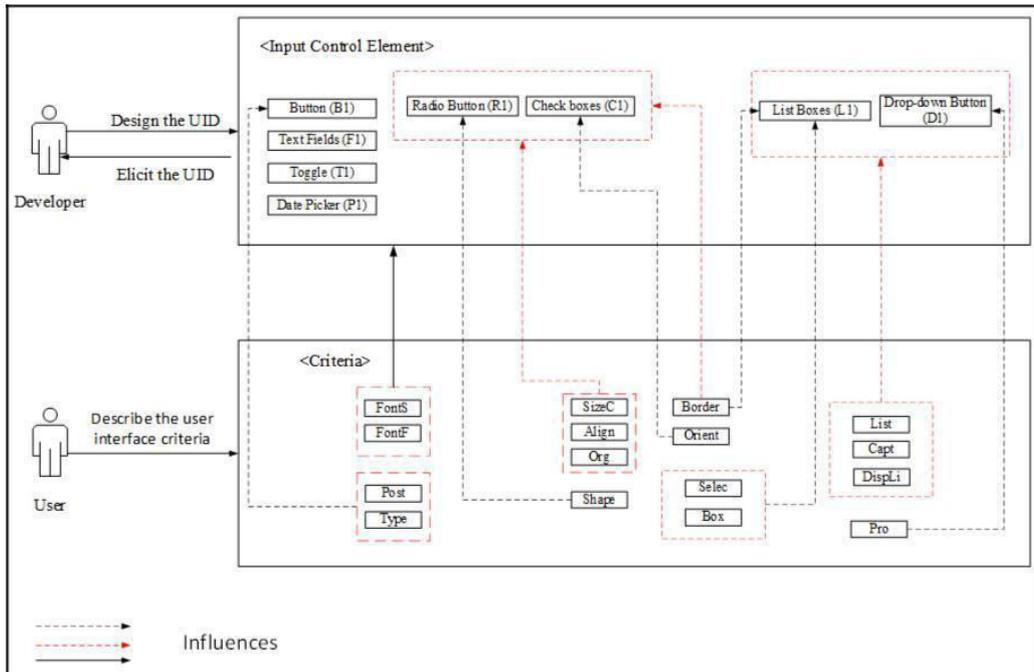


Figure 1. Conceptual diagram of the proposed approach

A conceptual framework is conceptual synonyms that denote to the dissimilar constructs (Imenda, 2014). Figure 1 illustrates the conceptual diagram of the prototype tool framework, which includes all input controls of the element of the user interface to elicit the elements of UID for Web applications.

### 4.2 The Prototype Design

The conceptual diagram was used as a reference to develop a prototype tool. The functions and the elements of input controls of UID also included in the prototype tool. The prototype tool consists of two main parts, client and Web application information, and the element of input controls of UID. Figure 2 illustrates algorithm for the prototype tool.

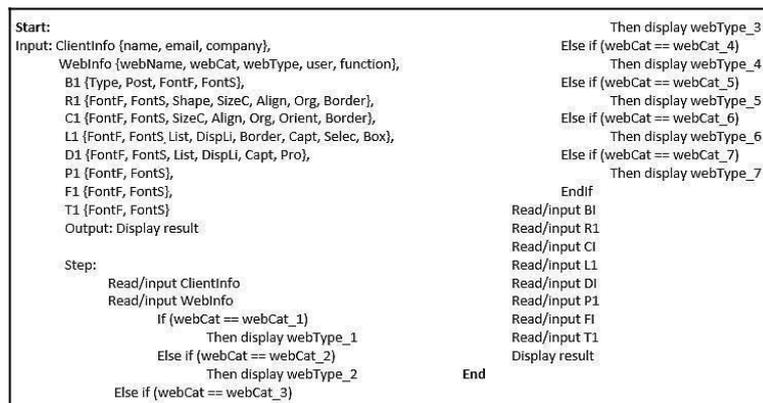


Figure 2. The algorithm for prototype tool

### 4.3 The Implementation

The prototype tool was developed based on the algorithm explained in the previous section. There are three categories of prototype tool in which are information category, elicitation of input controls, and summary of the selected criteria and its respective elements. Figure 3 shows the screenshots of the prototype tool.

Figure 3. The screenshot of the prototype tool

## 5 Result and Discussion

Since this study only focuses on how to elicit UID for web applications which used an interview-based approach, a use case diagram was prepared to visualize the evaluation process that will be explained in the next section. The actors of the use case where user and developer. Figure 4 illustrates use case diagram for the prototype tool.

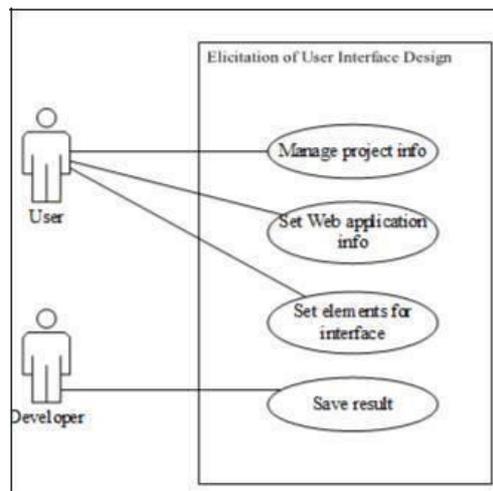


Figure 4. Use case diagram for the prototype tool

The task consists of two, Task 1 which is inserted client and Web application information, and Task 2, the elicitation of user interface input controls. For the Task 1, the user need to access the prototype tool and the detailed steps are as follows:

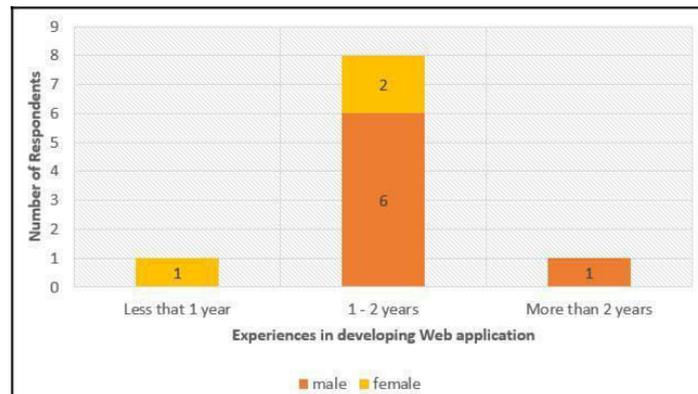
- i) The user needs to input the name, email, and company name in the Client's Information section.
- ii) Next, the user needs to fulfill the Web Application Information section by entering the name of the Web application.
- iii) The user need to choose the category of the Web application and then, the type of the Web application will be displayed according to what user choose previously for the category
- iv) Then, the user needs to describe who is the user of the Web application and state the main functionality that user expects to have from the Web application

Next, Task 2 will ask the user to select each input controls element and user were asked to view the provided form from the case study, which is SyerIlmu.com before start to elicit the input controls. The details are as for Table 1.

**Table 1.** Overall steps for user to elicit input controls

Step	Input control	Description
1	Button	User need to select type of button used, position, font family, and font size
2	Radio Button	User need to choose the shape, font family, font size, radio button size, position, align choices and description, border, and organization of the selection of the radio button
3	Checkbox	User need to choose font family, font size, checkbox size, border, orientation, align choices and description, and organization of the selection of the checkbox
4	List box	User need to choose the font family, font size, list size, box size, border, caption align, selection of lists, and summary of list box
5	Drop-down list	User need to choose font family, font size, list size, box size, prompt button, and caption position
6	Date picker	User need to choose font family, and font size
7	Text fields	User need to choose font family, and font size
8	Toggle	User need to choose font family, and font size

A questionnaire was contributed to 10 respondents. The proposed of the questionnaire was to see the effectiveness of the prototype tool and to gained the opinions of the respondents about the proposed approach of the prototype tool. Table 2 shows the summary of the questionnaire that has been conducted to 10 students from Faculty of Computing. From Figure 5, Male respondents made up 70% of participants and 60% have one until 2 years of developing Web applications experiences.



**Figure 5.** Respondent's demographic

From three general questions related to the research study, Table 2 shows the result. The highest mean was S2 which is 4.5 mark. This can be concluded that most of the respondents agreed that the UID is the essential part in developing Web applications.

**Table 2.** Summary of the questionnaire.

Respondent	S1	S2	S3
$R_1$	4	5	4
$R_2$	3	4	4
$R_3$	4	4	5

$R_4$	4	5	5
$R_5$	4	5	5
$R_6$	5	4	4
$R_7$	5	4	3
$R_8$	4	4	3
$R_9$	4	5	5
$R_{10}$	3	5	4
Total score	40	45	42
Mean score	4.0	4.5	4.2
Note: $R_x \rightarrow$ Respondent no. $x$			

Next, Figure 6 shows the mean for each of the question in Q1. The analysis depicted that respondents gave the most positive opinion towards question P4, which is the prototype tool can help the user in choosing the number of choices for radio button, check boxes, list box, and drop-down list. Moreover, the lowest mean is in question P5 and P13 which is 3.4. This can be concluded that most of the respondents are partially agreed for the question related to the border and shape of the radio button in input control elements.

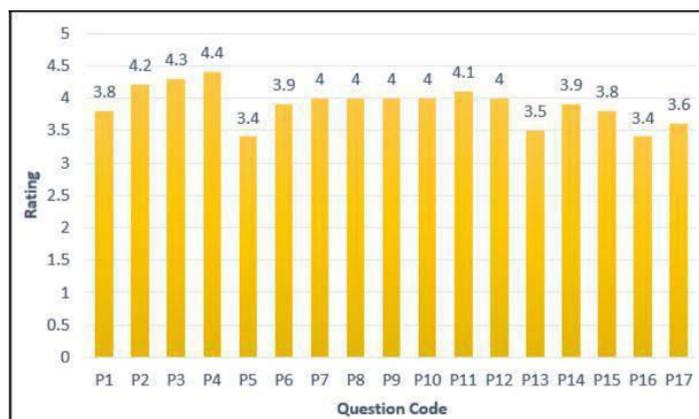


Figure 6. Overall mean for Q1

Lastly, Table 3 shows the summary of the question Q2, Q3, Q4, and Q5 respectively.

Code Discussion

- Q2 Eight out of ten respondents agreed that this prototype tool can help in eliciting the input controls of UID for the case study, while two respondents think that a prototype tool is a moderate tool that can help in eliciting the input controls.
- Q3 Half of the respondents agreed that the prototype tool is easy to use, while the other half of the respondent partially agreed that the tool is not easy to use, but too hard to understand, which answered the Q3 question.
- Q4 Six of the respondents agreed that the provided prototype tool is useful to software engineers when eliciting UID for input controls. Only four of the respondents partially thinks that a prototype tool is an average tool that can help software engineers to elicit the input controls of user interfaces.
- Q5 Three respondents suggested that the design of the prototype tool need to be more interesting so that any user will know the important of UID for Web applications. Furthermore, another three respondents recommended that each question needs to be stated more clearly so that the users will not be confused in using the tool. Two respondents recommended that the prototype tool should give an example of the user interface that has been chosen.

## 6 Conclusion

This research proposed approach to elicit UID for Web applications. The main objective is to propose an interview-based approach to elicit UID for a Web application. The prototype tool was developed to analyze the effectiveness of the proposed approach to help users and software engineers to elicit input control elements of UID.

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