

Author's Method of Designing Unified User Interface Web-Sites

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Abstract: The paper shows the author's classification of user interfaces. Defined standard-layout software projects and exemplary approach to the development of branded design techniques standardized user interfaces. Developed a method of designing a typed unified user interface, which includes: development of a technique of classification interfaces, development of criteria for usability interface, an assessment of factors that determine the performance and effectiveness of the software in its design, from which were formed the basic principles and algorithms of the program tester. A program-tester developed by students of the Web-user interfaces in preparation for the final qualifying works, which allows you to identify the key ergonomic characteristics: efficiency, reliability and performance.

Key words: Ergonomics • The user interface • Information system • Reliability • Information modelling

INTRODUCTION

In the development of software applications (software) in an intensive and competitive development of information technology remains an urgent challenge of providing quality (and ergonomics) user interface (UI).

The concept of quality of the SU set the international standard ISO DIS 9241-11-the so-called usability - usability interface, which includes information performance, efficiency and reliability of the interface as well as user satisfaction with the work performed [1].

Effective user interface design-is a dialogue between developers and users. It is based on a clear understanding of what the other side of the user interface are real people and that the correct design involves intensive communication with them. Unfortunately, software developers and users are not in the same room and often speak different languages. The only instrument of communication for them is the user interface itself [2].

Interface (joint, the interface device) provides human interaction with the technical device at the reception and evaluation of information, information preparation and decision-making, executive actions and communications. [3].

Technology of the UI and the funds instrumental that are used to implement it, form a coherent whole. The next step in the development of any of these components gives rise to the further development of other [4].

There are many recommendations for ergonomics at each stage of software development. However, due to the tight schedule of graduate design does not have time for an ergonomic study. In this regard, need to simplify unified method of creating software with ergonomic software.

An analysis of 300 subjects of diploma papers issued by the department for 10 years, engineers and bachelors showed that a large proportion (83%) is the software traditional document-type.

At the stage of technical design than the structural, functional, information and logic are selected or calculated SEI. Stage design engineering-build and compile the project finishes testing and measurement of achieved values ??of SEI. Naturally, this three-stage design in the educational process is compressed to 3-4 months and actually being in the same stage together.

The Program Combines the Tester:

- A single algorithm of actions the user in the framework of the above-mentioned software environment consists of a set of actions.
- Each action is recorded tester program and writes the statistics file.
- On the basis of analysis and comparison of fixed actions for each test the following information: productivity; efficiency; reliability.

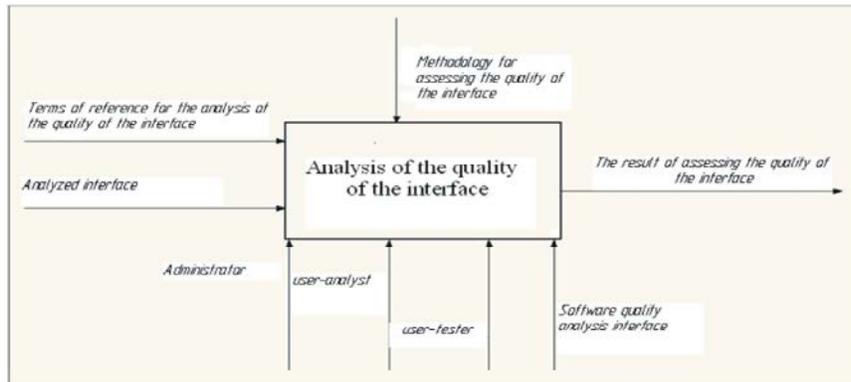


Fig. 1: Functional analysis of the quality of the interface model

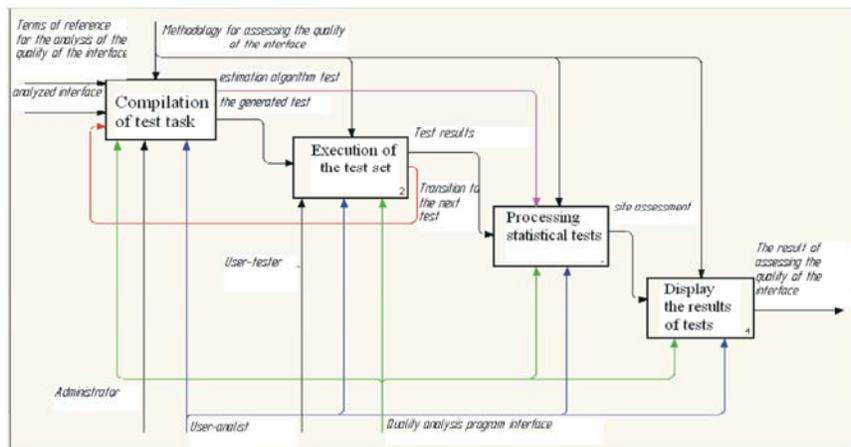


Fig. 2: Decomposition of the Level 1

Evaluation Performance (productivity) is often performed in the terminology model GOMS, or to the laws of Hick's and Fitt's for each function or sub-task of UI. In general, the Performance assesses how quickly the user reaches the target. If the interface is bad, then the user is studying it for a long time before you commit another act tends to his goal.

Therefore, according to how much time the user spent on the goal, can judge the performance of the interface.

Effectiveness evaluation should take into account the degree of influence of the interface on the completeness and accuracy of the achieve user targeted results [5-8].

The accuracy and efficiency of the goal can be understood as the number of transactions of a type for which the user reaches the target. If one interface allows you to achieve the goal of 3 clicks and the other for 5, the first interface is more effective. Although in terms of performance, you can quickly make 5 clicks than 3. But that is another option.

Evaluation of reliability must take into account the random nature of user activity, the possibility (probability) of logical fallacies and violations of the right sequence and timing of user actions in relation to the characteristics of the interface elements-its layout, brightness, contrast, coding principles, alphabet, font settings and the like.

A functional model of the program, the tester is shown in Figure 1 and 2.

Program Description Usability Tester: The program is designed for usability tester interface internet resource assessment, whether an online store, or another site [9].

The Basic Principle of the Tester Is as Follows:

- An expert on the program server records the standard of the site;
- The clients connect to the server and get the job;
- Clients perform the task;
- The client sends the server the job;

- The server compares the results with reference customers and makes the assessment in terms of performance, efficiency, reliability;
- Under construction site on the final assessment of this test.

Description of the Method of Testing: The methodology of the test site is quite simple and involves five basic steps:

Registration of a New Test System: When you click "Add" in the "Sites" are prompted to add a site, there are introducing «name.com». Then, under "Tests" press the button "Add" and add a new test. Fill in the field assignments, the initial url. Add a new pattern to this test;

Record the Expert Reference for this Test: After entering the name of the standard program automatically switches the user to the tab "Pre-recording standard."

Automatically loaded front page specified when creating the test. Now you need to set the keyboard layout to Russian. Then click the right mouse button on your browser to the starting position. You can also manually enter these coordinates in the X and Y. In the task was given to the initial coordinates were 100:100

The program is now ready to record a reference. Click on the button "Start Recording".

When the judge reaches the goal, you need to click on the "Stop Recording" and confirm saving standard. After that come standard on the tab "Create / edit / select test";

Set a Target Event for Reference: The target event-an event at which a user - the tester program considers that the purpose of the test is achieved.

The Target of the Event Can Be: Clicks on some element in the browser, release the mouse button on some element in the browser, press the key on the keyboard when the focus is on a specific item in the browser, click on the link, obtaining input focus to the browser, double-click on an item in the browser; loading a new page in the browser.

When you click the tab "Goal Setting for standard" is an automatic loading start page. In this tab, the program will select one expert from the appropriate events as the target of the event. To do this, click on "Download standard." Will load in the standard, recorded in step 2.

Then Select One of the Following:

- Stop playing standard;
- Losing by one step;
- To lose track of next possible target;
- Automatically lose to the end;
- To return to the top of the standard; f) Maintain the current target in the standard.

It is best to use the command "c", then the program will automatically play the model before the event, which potentially can be set target. The button "->" allows you to run many times one of the selected events from a) to f). Thus, you can play manually for each transaction, but you can use the command "c".

The command a) stops auto play model. Team e) overload model of the beginning. Team f) allows to save the current target in the standard.

The meaning of the process are as follows: the model will be played, performing all the same, he was following expert manually, but now the program. The program is possible when the target event will signal this by semaphore "? target".

During playback, the model can be displayed on-screen error message «html-element is not found." These errors are not critical if the event should not be a target. They mean that the program fails to uniquely identify html-element. If this event should not be a target, you have to press the "OK" button and resume playback of the model. To ensure the success of such events should not be where the program was not able to identify the html-element to make the target.

You can use the action of the b) and lose the step up to the moment when the input field does not appear the text "hello".

In the box also displays the Shift and Alt-it was produced by switching the language keyboard layout from English to Russian. The program is recorded and these actions.

To set up the event to the target, select the action a). Click "OK". Now the standard is written in the target event.

Start the Server and Receive Statistics from the Customers: Go to the fourth tab of the "Start / Stop the server." The idea is this: on the users' computers Testers are copies of the "tester program - the client."

Judge starts the server in the "tester program-SERVER". Clients connect to the server, get set for the test. Then they perform the test and send statistics to the server. The server collects the statistics from clients.

When you click "Start Server" start up the server for the site and test selected on the "Create / edit / test selection." Did you select the standard for this test, the server does not matter. His task is to distribute tasks and collect results.

Note that because the target client event is not transmitted, in principle, the client can not access it. The idea is this: the client receives a verbal task for this test. He does not have to know that there is a target event.

Let's go back to the server. The tab IP-address displays the current IP-address of the machine running the server program. To guarantee the performance should be using the commands Windows "CMD -> IP-CONFIG / all" to make sure that the IP-address - is the IP-address of the adapter that is connected to the LAN. The port can also be changed, but it is better to leave this as is.

At server startup, the server is waiting for the customers. When a client connects, the server sends him the job for the test and enters MAC-address of the client in the list to "Get the Task." The server has no control over whether to perform a real client job or not. When a customer completes the task, it automatically to the specified server IP and port sends statistics. Server receives the statistics, check it for errors (coding standards compliance of operations and the number of parameters in each operation).

Thus, the list of "Get the Task" and "Run Test" allow the expert control of the passage of test customers. In addition, there is a window "CONSOLE", which are recorded messages from the server on connecting customers and progress with them.

When all clients have moved from the list to "Get the Task" in the list of "Run Test", the expert presses the "Stop Server". He can stop the server, even when customers still pass the test and then turn it on and accept the results. But there is a violation of the output lists of information to "Get the Task" and "Run Test".

If the client is not able to send the statistics, it will be so in the list to "Get the Task." Then the expert will simply stop the server.

This is possible because the client and the server are running asynchronously. Here is the interface of the client. It is simple - two tabs: "To connect to the server" and "Pass the Test".

It is necessary to enter the IP-address of the server manually each time you start the client! When you click "Connect and Get the Task", the client receives from the server task. Button "Pass the Test" to become available to the press.

Construction of the Report: Report constructed for all test site if the test is found for a particular active model and at least one result from the client.

For each test, the program is looking for an active reference. For the active reference rates are calculated. From the active reference is also extracted the target event. Then, for each file statistics, successfully obtained from each customer, the operations are performed:

Check whether the client has reached the target of the event. If not, then all totals (productivity, efficiency, completeness) for the test set to zero. That is, the test is not passed.

Evaluates Performance, calculated Efficiency; calculated Reliability; final grade is calculated as the average of the Performance, Efficiency, Reliability.

Thus, based on these indicators can be compared with the standard of customer results and check the quality of the interface of the site. Because the expert knows so well interface and works it quickly, efficiently and without errors. But the new customer, if the interface is poorly built, will spend more time, will make a lot of mistakes and will spend more basic operations to achieve the goal, or do not reach it.

That is, we have a universal methodology to assess the interfaces of any web - sites.

Consider the bottom of the report table - extended report on each test. It is loaded when you click the mouse on the top line of the main table. Advanced report shows information of each customer and the main report (table top) shows summary statistics for all tests in comparison with the reference of the expert.

Note that the reference parameters are set to 1, it means 100%. If a client passed the test better, its performance will be less than 1, that is, he spent less resources to achieve the goal. Conversely, if, for example, client performance «00104B44D633» 1.74, it means that the client longer reached target 74% of the time. If, for example, the efficiency of customer «006008750D7A» 0.88, this means that the client spent achieving a minimal average number of basic operations than recording expert reference.

Regarding the assessment of the overall impact, it can be seen from the figure that the customers «00104B4994E1» and «006008750D7A» pass the test more efficiently than the expert. Hence, these results add to the standards appropriate to this test. Then, on the "Create / Edit / Select Test" can be established benchmark «006008750D7A» as an active (and standard expert is no longer active.) Adding a client to the list of the standards for the test is done by double clicking the mouse on the appropriate line in the extended table (below). In this case, click 'Create / Edit / Select Test " should be selected test.

In general, as a result of testing we get an array of digital data, conclusions on the basis of which depend on the dynamics of change between the base (extended) and the standard version and for change in the architecture of the interface at the time of comparison, custom algorithms.

Tester program is written in such a way that abstracts the user's subjective assessment and consider the interface in terms of the amounts of Performance, Reliability and Efficiency. These figures are calculated by the system based on the recording of user actions or expert [10, 11].

RESULTS

Developed a method of designing a typed unified user interface, which includes: development of a technique of classification interfaces, development of criteria for usability interface, an assessment of factors that determine the performance and effectiveness of the software in its design, from which were formed the basic principles and algorithms of the program tester.

Algorithm is developed and written (in the language C #, among Microsoft Visual C # Express Edition 2010), the program tester UI websites enables you to test all kinds of information resources on the Internet that can be presented as a web page.

Investigations UI Web sites, as with the original interface and with the changes. The interface was evaluated by indicators such as productivity, efficiency and reliability. A feature of this software is that here the author tried to move away from the most subjective evaluation of the interface from the user, reducing the interface to the evaluation of mathematical calculation of the many

indicators that characterized the actions of a real user, who worked with the system.

An assessment of the usability of UI and copyrights developed recommendations to improve the convenience of a web-interface applications that have affected the characteristics such as: functional completeness, stylistic flexibility; optional flexibility, sound, aesthetics, the focus of attention.

The developed methodology and software can be used in the field of outsourcing companies to test the real usability of websites. The software can also be used in schools to verify that the sites developed by students as part of the course and diploma projects.

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