

Heuristic Usability Evaluation Report – Team 54

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1 INTRODUCTION

The primary objective for this usability evaluation is to not only identify a diverse range of existing usability issues in the application that adversely impacts the user experience but to also understand their extent, severity, and probable cause. The underlying purpose is to improve the overall user experience as well as the quality of the application, which will be measured with respect to pre-established heuristics.

For the evaluation, the latest state of the application is designated as the prototype: a walk-through video, showcasing the current features and functionalities of the application that are available through the user interface.

The application starts the first scene, which connects clients to the server. If the client enters an invalid URL or if the connection fails an error message will alert the user. Once connected, the client gets to the "Home" view and can create boards using a "Create" button. The boards will appear in a list and they can be accessed by clicking on the name. The "BoardView" scene contains three default columns. To add a column, the client presses an intuitive "Add Column" button, and to add a card, the plus button is located under the last card in a column. The user can easily navigate between cards and columns using a scrollbar. Every change made to the board, addition/deletion/edit (column name, card name) is also reflected in the database. Moreover, users can drag and drop columns and cards and delete them by putting them in the bin. When clicking on "==" in a card, the client enters the "CardView" scene. The scene is divided into three sections: description, list of tasks, and list of tags. Going back to the "BoardView" scene, the board can be erased using the "Delete" button in the left bottom corner(which opens an error prevention popup.).From the "Home" scene, the client can disconnect from the server and connect to a different one without closing the application. In the board overview, there is a "CopyId" button that the client can press to copy the id of the board, which can be seen in the prototype. When multiple clients connect to the app at the same time, changes made to the title of the board in the "BoardOverview" scene are reflected in the "Home" scene. Moreover, if a client adds a board, it will also appear in the other clients' "Home" scene. The end of the video shows some scenes that are used for customization but are not linked to any scene yet.

2 METHODS

2.1 Evaluators and Demographics

The expert evaluators consist of five OOP-Project Course (CSE1105) students, who are familiar with heuristic usability evaluations and with the requirements of the applications. Although the evaluators are all from the same team, each should complete the evaluation individually and independently to ensure the diversity and distinctiveness of reported usability issues. Considering demographics, the evaluator pool consisted of young adults with mixed nationalities, aged between 18 and 21, studying Computer Science as part

of a Bachelor level program. As such, the evaluators can be considered to be proficient with computer usage and have considerable expertise in understanding the potential under-workings of the application.

2.2 Preparation and Procedure

2.2.1 Early Preparation. In order to facilitate the evaluation, the expert evaluators should have received an *Expert Instruction* document which details the available resources, the procedure for the evaluation, as well as the recording process and format for the encountered usability issues.

Before beginning the evaluation process, each expert evaluator was asked to thoroughly review the instruction document. They were also asked to create a new document on which they can easily record text.

2.2.2 Procedure. Once the experts clearly understood the instructions, the evaluators were asked to view the prototypes three times in a row. Expert evaluators were asked to first watch the prototype video in its entirety to gain a complete understanding of the application's purpose and functionality. After the initial viewing, they were asked to examine each feature and functionality that is presented in the video separately in the next two viewings. To that end, the video is divided into sections, each showcasing a specific feature or functionality that is identified by a bottom-left annotation.

The features and functionalities in the prototype video include server connection and disconnection; board creation, access, and renaming; card and column creation, modification, and deletion; drag-and-drop features; auto-synchronization of changes; error prevention features; and user interface design. The video presents the aforementioned in multiple scenarios, under diverse conditions, and with different user inputs in order to account for possible user behaviors; this is done to counteract the lack of direct interaction by the evaluators with the application due to the static nature of the video.

2.2.3 Identification of usability issues. As per a heuristic evaluation design, experts were asked to consider heuristics [2] as guidelines in order to determine whether a particular design, feature, or functionality contains or is a usability issue.

- (1) visibility of system status – The user interface should display any ongoing application processes, results, and their availability, and the current settings of the application as needed.
- (2) match between system and the real world – Information and data in the application should reflect the real world.
- (3) user control and freedom – Users should be able to deliberately and conveniently control the user interface for their own needs with a wide variety of control operations.

- (4) consistency and standards – The application should adhere to common, or agreed-upon, standards and measures. The application should be consistent in design.
- (5) error prevention – The application should have built-in measures to prevent users from committing errors, especially those of the irreversible kind.
- (6) recognition rather than recall – The application should be able to intuitively prompt the user to perform actions when need or to understand information as presented without much additional operational knowledge.
- (7) flexibility and efficiency of use – Users should be able to use the application effectively, efficiently, and quickly.
- (8) aesthetic and minimalist design – The design of the application does not contain any superfluous or redundant elements.
- (9) help users recognize, diagnose, and recover from errors – The application should efficiently and effectively inform the users on encountered problems, and how to resolve them.
- (10) help and documentation – The application should have accompanying set-up and operational information that users can use.

2.3 Measurements and Recording

In order to report the encountered, the experts were asked to provide information in the following efficient format[1]:

- a short specification of the usability issue
- a list of possible or actual difficulties that the issue will cause to the users
- the specific context in which the issue arises
- a probable cause

After the expert evaluators completed the usability issues, they were asked to digitally share their recording document, which contains the raw documentation of usability issues that they encountered.

3 RESULTS

3.1 Result Processing

Following the conclusion of all usability evaluations, we have compiled a list of all the reported usability issues. To analyze the raw data, we have first eliminated redundancy by combining usability issues that refer to the same problem. We have also noted the multiplicity of the issues as a measure of their frequency. To facilitate the analysis, each issue was categorized by the feature or functionality to which it refers, by the heuristic to which it falls under, and by whether it relates to the functionality (the underlying logic of the application) or to the user interface (the visual appearance of the application).

3.2 Results & Statistics

The processed results are summarized below (refer to Figure 2 for overall distribution).

- (1) **Lack of Drag-and-Drop Visibility** (*user control and freedom*) – lack of indication for card and column repositioning and deletion during the drag gesture.

- (2) **Prevention of Accidental Deletion**(*error prevention*) – there is no guard against accidental deletion of columns, cards, and tasks.
- (3) **Hard-coded Task Description** (*user control and freedom*) – the user doesn't have the flexibility to change the default task description.
- (4) **Synchronized Modification Conflicts**(*Error Prevention, Consistence and Standard*) – improper functioning of board and column auto-synchronization leads to conflicts in simultaneous modification by multiple users.
- (5) **Unaided Board Search** (*flexibility and efficiency of use*) – the application does not help the user to search for new boards, requiring the user to know the full correct corresponding board key.
- (6) **Non-intuitive Drag-and-Drop Deletion Mechanism** (*recognition rather than recall*) – the drag-to-bin deletion mechanism is difficult to be understood by the user at first, without any guidance.
- (7) **Absence of Double-Click Mechanism for Detail Access** (*Recognition rather than Recall*) – users cannot intuitively double click on a card in order to access its overview.
- (8) **Indication of Additional description** (*flexibility and efficiency of use*) – the user cannot determine whether a card has additional description, except in the dedicated overview.
- (9) **Customization Cancellation** (*user control and freedom*) – users are unable to cancel in the customization overview.
- (10) **Lack of Scroll Bars** (*consistency and standards*) – there are no internal scroll bars for the individual columns.
- (11) **Improper Card Size** (*aesthetic and minimalistic design*) – the size of the card design is too large, causing some issues with the drag-and-drop mechanisms.
- (12) **Lack of Return Button** (*user control and freedom*) – the user is unable to return to the board overview from the customization overview.
- (13) **Unwanted Automatic Saving** (*user control and freedom*) – changes to the card details are saved immediately.
- (14) **Password Protected Boards Design** (*recognition rather than recall, flexibility and efficiency of use*) – the position of the password field is far away from the position of the boards list, making the design not intuitive and clear.
- (15) **Board Title Mismatch** (*consistency and standards*) – the board title may appear differently in different overviews.
- (16) **Lack of Help Support** (*help and documentation*) - the users do not have a simple method to understand all of the existing shortcuts and non-visual functionalities without guidance.

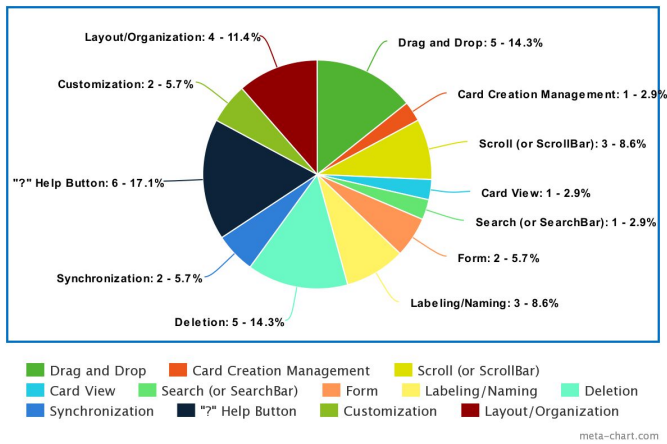


Figure 1: Distribution of processed usability issues reported by the evaluators.

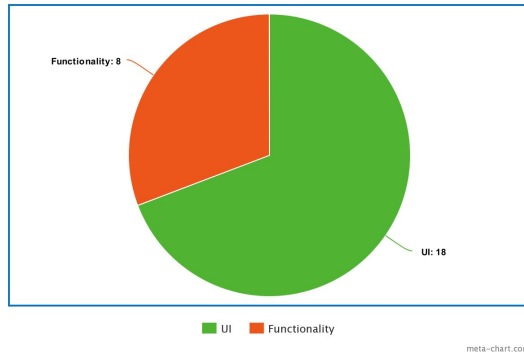


Figure 2: Distribution of the type of processed usability issues. (*functionality* refers to the application's logic, whereas *UI* refers to the visual design.).

3.3 Prioritization

By considering the frequency of a particular usability as well as the evaluators' input on the potential adverse impact of the issues on the user experience, the frequency and impact of each usability issue was quantified on a discrete scale from 1 to 5. The frequency-impact pairs are presented in the scatter plot below, which can be used to determine the severity of each issue.

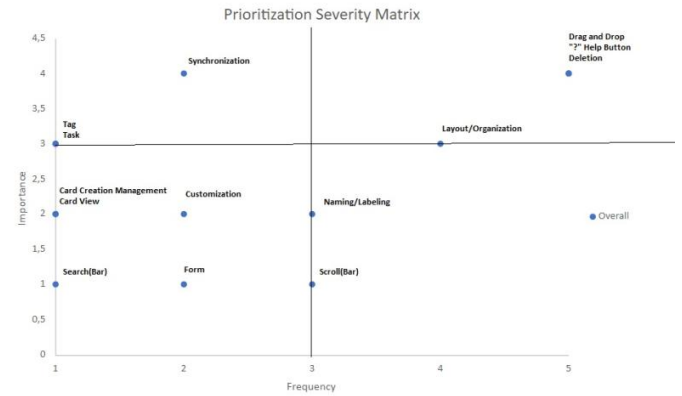


Figure 3: A severity scatter plot that maps the frequency of appearance and adverse impact of each usability issue.

As presented above, many issues were related to the drag & drop element, the absence of a help button, and the deletion through drag & drop which would handle eventually intuitive features. Therefore in terms of frequency, we can conclude that these are at the top of the list. In addition to this, drag & drop is one of the most relevant features of our application, therefore we are choosing this as a top priority along with deletion and the non-existing help button.

The next issues on the prioritization list are related to synchronization, the aspect of the application, the scroll-bar for columns, the customization and labeling of columns or cards, they also appearing clearly less times than the top ones with around 5-8% in terms of the experts' feedback.

The least frequent issues are related to the details inside a card, tasks and tags, and the search bar since the average user does not always want to have advanced cards or they are mainly using the boards created by themselves.

4 CONCLUSIONS & IMPROVEMENTS

4.1 Conclusions

From the results of the heuristic evaluation, we can draw three principal conclusions.

Firstly, from the usability issues, it is clear that the prototype presented was very incomplete in function to the expected product. Broadly speaking, this conclusion refers to the bulk of omitted or malfunctioning auto-synchronization-related issues as well as task editing and modification issues that the evaluators reported. Although the evaluators did not encounter such issues frequently, and were generally discouraged from reporting such issues of incompleteness by the given instructions, leading to decreased reported frequency, these issues should be considered as especially severe as their impact on the user experience in practice is great. Arguably, the presence of such incompleteness in the first place may have been an unaccounted distraction for the evaluators, masking otherwise significant issues during the evaluation.

Secondly, the various features and functionalities in the application should be intuitive insofar as they can be easily realized and grasped by the user at will. This conclusion is evident by the

reported usability issues dealing with the lack of informative UI features for the drag-and-drop process, and by the lack of auto-correction / suggestion functionality in the search bar. While the immediate solutions for such issues are extensions to the application (as such details are neither required nor prerequisite for the project requirements), their absence can still affect the overall completeness, efficiency, and effectiveness of the application. However, the calculated severity, and corresponding prioritization, may be much greater than the actual severity; evaluators may have been inclined to report the absence of facilitative features due to such features' frequent appearance in other comparable yet irrelevant applications.

Thirdly, the application should adhere to a farther-reaching standard of user error prevention through a more thorough implementation of a confirmation dialog on the deletion and through the imposition of constraints in any and all user input opportunities.

4.2 Improvements

Considering the conclusions of the evaluation, we recommend the following improvements in order to address the currently outstanding usability issues.

4.2.1 Incompleteness of features. There are no meaningful improvements to suggest for this type of issue beyond ensuring that the application is robust and complete.

4.2.2 Intuitive design. For this type of issue, the improvements will be suggested on an issue-by-issue basis. To resolve issue (1), the application can display an image copy of the dragged object (see Figure 4). This can allow the users to immediately understand and remember what was dragged. To resolve issues (6), (7), and (16), the application can include a help box that explains all of the available functionalities (see Figure 5). Moreover, such a help zone may be scene-specific, which will allow users to find the most relevant information for the current overview. For issue (11), the card visual may be extended to contain additional indicators — such as ones for additional description, task progress, and tags —, which will allow the user to understand the details of a card at a glance (see Figure 6). Additionally, the elements inside of the card can be made smaller in order to allow for more 'draggable' space, resolving issue (8).

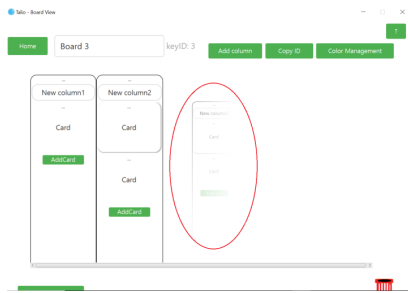


Figure 4: An example of a visible image-copy of a dragged object.

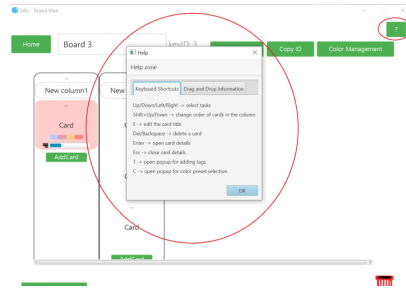


Figure 5: An example of a possible help zone design.



Figure 6: An example of a new card design that shows the various indicators for tags, additional description, and task progress

4.2.3 Error prevention. There are two primary ways to improve the error prevention capabilities of the application. The first way is to introduce dialog boxes that ask for confirmation of a particular 'dangerous' action or that inform the users after a 'dangerous' action has been carried. This can be especially useful for deletion (see Figure 7), which will resolve issue (2). The second way is to include constraint labels that will inform the user for particular input constraints that will be enforced by the application (see Figure 8). This will not only intuitively convey the limitations of input to the user clearly, but they will ensure the integrity of the data. Additionally, in order to prevent an automatic save of incorrect information (issue (13)), the application can be designed to not save changes unless the user allows the save. This can be done intuitively by relying on a common keyboard shortcut, such as the *enter* key (see Figure 8).

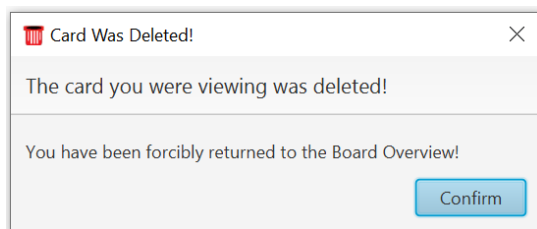


Figure 7: An example of a dialog box that informs the user of the completion of a 'dangerous' action

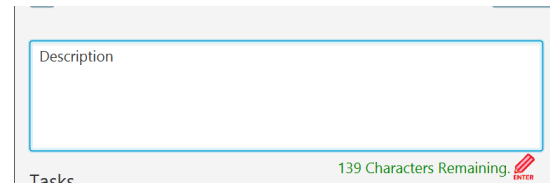


Figure 8: An example of a constraint message and an indication for the user to save the changes using the *enter* key(bottom-right corner).

REFERENCES

- [1] Cockton, G., Woolrych, A., Hall, L., & Hindmarch, M. 2004. Changing analysts' tunes: the surprising impact of a new instrument for usability inspection method assessment.. In *In People and computers XVII—Designing for society*. Springer, London, 145–161.
- [2] Nielsen, J. 2003. 10 Usability Heuristics for User Interface Design. Nielsen Norman Group. <https://www.nngroup.com/articles/ten-usability-heuristics/>.