

Heuristic Usability Evaluation

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1 INTRODUCTION

- (1) The objective of our evaluation is to assess the effectiveness and efficiency of our web application. This evaluation aims to provide valuable insights into the implementation, inform decision-making and improve performance. We are seeking to identify strengths and weaknesses and to find areas of improvement and optimization. Based on these results, we aim to adjust the user interface of our application in order to minimize, or ideally fully solve, the problems previously identified by our experts in order to have an application that better satisfies the user.
- (2) The prototype that is being evaluated contains the current state of our application. It is still under development, therefore some functionality is still not present in the prototype. Nevertheless, it is sufficient for the purpose of this evaluation to provide valuable insight into the areas of opportunity of our project.

The prototype contains the overview of our application which includes the selected board and displays the contents of said board as lists. These lists are populated by the tasks corresponding to themselves which is currently what could be considered the main page of our application. From these pages, there are various views that can be accessed for different actions inside the application. These include a window that allows for the creation of a new list, a similar window utilized for the creation of a new task, one more window which has the purpose of modifying a previously created task, and finally a pop-up that confirms the deletion of a table.

2 METHODS

2.1 Experts

We choose an accomplished team of teen computer scientists which consisted of 6 members. They have worked on such projects before, so they have the necessary expertise regarding such matters and will provide the insight required for us to improve our User Interface.

2.2 Procedure

- (1) We made an elaborate plan about how the evaluation should be realized and used it to instruct our team of experts. We first contacted one of the evaluators that were working on a similar project which gave him the required knowledge to do an effective evaluation. He later contacted his team about the possibility of collaborating with us and only after they agreed to form part of our team of evaluators, we presented them with the mock and the instructions for

the evaluation. The evaluators are all students of Computer Science and Engineering at TU Delft who were developing a similar application to the one being tested, this provides them with plenty of insight as to what the goals of our application are and how can we come closer to achieving them. We created a form that was to be filled out by each of the evaluators after they had been instructed to test the application for around one hour and fulfill certain tasks such as creating and deleting tasks. In this form, we asked the evaluators to select a heuristic that broadly described what the issue they found related to, as well as information on the issue such as specific contexts when the issue might show up, and why the issue is there among others. Finally and most importantly the evaluators were asked to give a value from 1 to 5 on how frequently was the issue encountered and how impactful said the issue was on the usage of the application. We presented the evaluators with more context on the solutions our application aims to provide and who will be using the product.

- (2) The chosen team of experts looked at a prototype that reflects the current state of our application. It contains a view of the current board: the button which allows the user to add a new list, the actual lists containing tasks, the progress bar which reflects whether the task is completed or not, the deleting tasks or lists buttons, the adding tasks feature and the editing tasks functionality by clicking the three-dots-button. There are also frames for creating a list or a card, editing a task, and a pop-up that appears when deleting elements. Each of the aforementioned buttons would display a new view representative of what they would implement in the final product. For E.g. clicking the edit task button will show a screen where you can update the information of the selected task such as its title and description. This mockup was created using *Figma* which also allowed for a dynamic flow between the pages using buttons as our real application would.

As for the design choice of our application, we were aiming for a minimalist approach, but, unfortunately, our project is still under development and therefore the design work is planned for a later stage of the process. Thus, the experts were instructed to give meaningful suggestions about the design as it is still to be taken care of.

- (3) The experts need to analyze the functionality and efficiency of our prototype. Therefore, they have to explore the application and its features and give us feedback on it, including what is missing, what can be improved or what is redundant.

The suggested time for reviewing the application is one hour and a form especially made for it should be concomitantly filled out. Subsequently, the form should be submitted and, after every expert sent theirs, charts should be automatically generated and we should be able to see the evaluation that was provided.

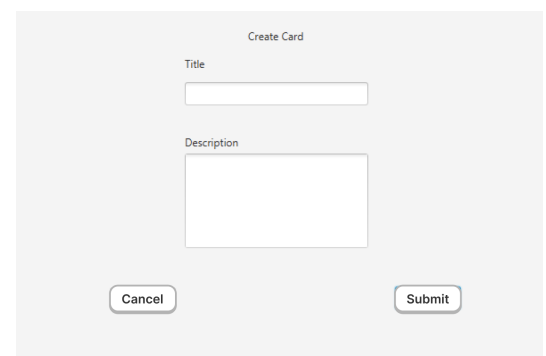
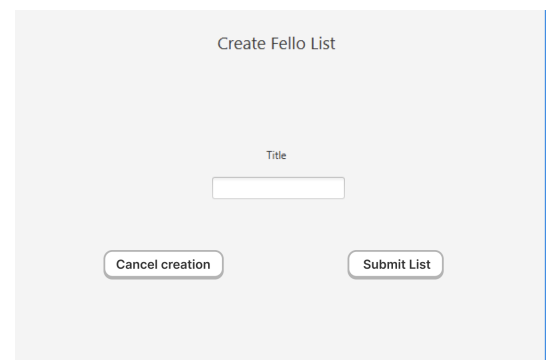
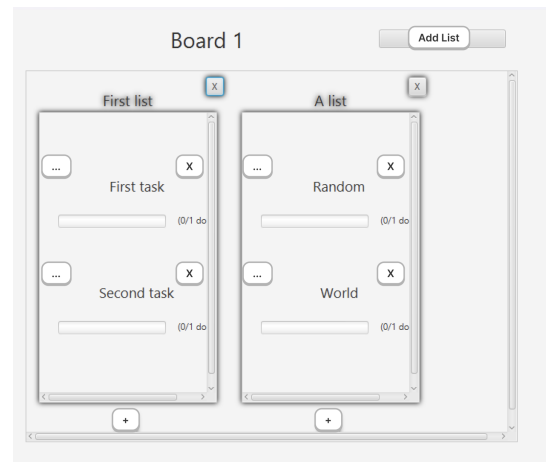
- (4) A heuristic is a strategy derived from a process of trial and error that enables one to solve a given problem by making use of previous experiences. Keeping that in mind, we made sure that the team of experts we chose is using the following heuristics:
- **Visibility of system status:** This heuristic is about the system's ability on keeping the users informed about what is going on, with appropriate feedback in a timely fashion.
 - **Match between the system and the real world:** This heuristic is for evaluating a system's usage of language. The system should speak the user's language, with words, phrases, and concepts familiar to the user, and keep technical terms to a minimum.
 - **User control and freedom:** This heuristic is about the forgiveness of a system. System functions may be chosen by the user by mistake, so they need a clear way of canceling their action(s) without having too many difficulties.
 - **Consistency and standards:** This heuristic is about the consistency/uniformity of a system. For example, Users should not have to wonder whether different words, situations, or actions mean the same thing.
 - **Error prevention:** This heuristic is about how apt a system is in preventing errors. For example, a system that prevents an error from occurring in the first place is better than a system that just displays an error message.
 - **Recognition rather than recall:** This evaluates how well a system displays information/possible instructions. The user should not have to constantly remember information to take it to another part of the system. The instructions for using the system should be visible or easily retrievable whenever needed.
 - **Flexibility and efficiency of use:** This evaluates how user-friendly the system is. Things like macros may often speed up the interaction for both novice and expert users alike. This makes it possible for the system to cater to both inexperienced and experienced users.
 - **Aesthetic and minimalist design:** This evaluates the visual clutter of the system. Interface items should only contain information that is relevant. Only relevant information should be on the screen for the user.
 - **Help users recognize, diagnose, and recover from errors:** This evaluates the helpfulness of a system whenever a user encounters a problem. The system should help the user with things such as error messages with the problem expressed in a clear and plain way and help the user to locate the problem.
 - **Help and documentation:** This evaluates the resources given by the system. Although the system should be able to be used without documentation, it may be helpful to provide help in some form. This information should be

easy to search and context-sensitive to what the user is looking for.

Each one of these aforementioned heuristics is crucial in the process of improving our product.

2.3 Mockup

Finally, we presented the experts with a figma application in which buttons were placed to follow the flow of the actual application. These are the views that were included in the said application for the experts to interact with:



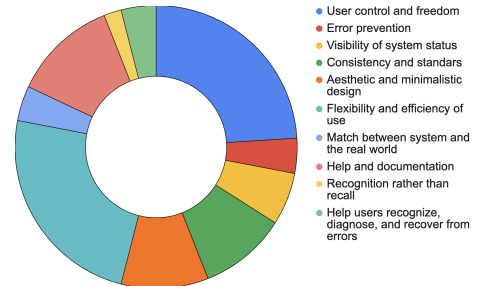
2.4 Measures (Data Collection)

For each heuristic, we wanted to measure how frequently a certain issue related to said heuristic appeared in our interface and how severe the issue was. The frequency of each issue was measured from 1 to 5, from very rare to very common. The severity/impact of the issue was also measured from 1 to 5, from very minor to very severe. Every expert gave us a maximum of 10 evaluations/issues about the provided interface. For every evaluation, the expert did the following:

- A summary description of the evaluation (optional)
 - Determining to what heuristic the evaluation belongs.
 - A description of the issue.
 - The likely difficulties for the user if they encounter the issue.
 - The specific context in which the issue may occur.
 - The assumed cause(s) of the issue.
 - How frequently the issue appears in the interface.
 - How much of an impact the issue had if left unresolved.
- The experts gave all of their evaluations via Google Forms, this tool helped to compile their observations in an orderly manner and allowed for a more analytical view of the found problems. Some of the found problems are:
- Lack of clarity in the edit task/edit list button
 - Unreadable list title due to shadows
 - No confirmation for deletion
 - No way of changing the server
 - No customization

- Task and card are used interchangeably
- Horizontal scroll on tasks

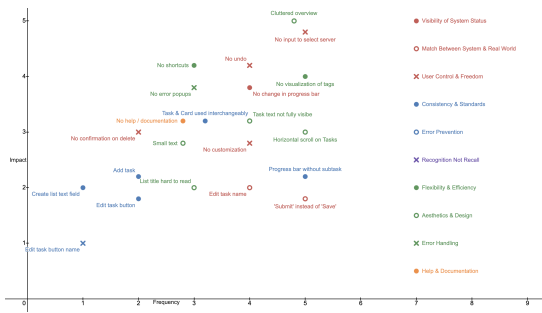
The following pie chart shows the distribution of the heuristics the found problems were pointed towards to:



3 RESULTS

- (1) By involving the correct number of evaluators, we were able to gather very valuable insight into the main weaknesses of the current state of our application which will modify our course of action moving forward as we try to finish and improve our application. Some issues were pointed out several times by different evaluators such as the edit button in our task not being clear enough. More value came out of those issues that were pointed out only once as these are harder to find, a clear example being the lack of a visual division between the tasks which can lead to confusion as to which button corresponds to which task. Most of the issues pointed towards the functionality in some of the buttons not being clear enough. Some other issues were pointed out due to the current state of the application which is still missing some more functionality but overall we found various areas of improvement in the views we have already implemented which we would likely not have found if it was not for this group of evaluators.
- (2) As previously mentioned, some issues were pointed out several times by different evaluators with different heuristics in mind as well as different values for the frequency as well as the impact of said issue. In order to avoid redundancy, we averaged the frequency and impact of the issues that were recurrently mentioned and selected the heuristic most commonly associated with said issue.
- (3) In order to prioritize the issues that were pointed out, we utilized a Cartesian plane that takes the values given for frequency and impact for each issue and placed each problem accordingly inside the plane. After all, issues had been placed, we prioritized those further from the origin first. We also considered how often issues with the same weight were pointed out as a tiebreaker.

Heuristic Category	Description
User control and freedom	No confirmation box on the deletion of lists or tasks
User control and freedom	It doesn't give the user a lot of creative freedom.
User control and freedom	Unable to find the scene to enter server address
User control and freedom	Unable to find a button to edit list name
Consistency and Standards	'...' button on the card is not interpretable by everyone in the same way
Consistency and Standards	Adding cards button is outside the card
Help and documentation	No help buttons or page with documentation
Visibility of system status	Cannot change the progress of tasks. Tasks have a progress tracker (0/1 done), but there seems to be no way of changing/adding progress.
Visibility of system status	There is no functionality at all. (Most likely because it's just a mockup.)
Recognition rather than recall	Edit button is not obviously an edit button. Its label is "..." instead of a more clear name
Error prevention	No confirmation pop-up when deleting.
Aesthetic and minimalist design	The shadow effect on top of the lists is harder to read and it could be replaced with a bigger font and a bold.
Aesthetic and minimalist design	The writing is really small in most of the frames..
Match between system and real-world	The edit dots are on the left which is different from most of the other systems out there that have them in the top right.



4 CONCLUSIONS & IMPROVEMENTS

We learned that the most pressing problems come from the missing functionality that still needs to be implemented but that the most commonly spotted ones are those related to the intuitive use of the buttons. This shows that the biggest area of opportunity is related to the overall structure of the application to make the button's functions more clear. We also noticed that the most mentioned one was the lack of confirmation upon the removal of an element. By following the previously shown graph, we prioritized the problems by how far they are from the origin of the graph, meaning that those with the highest frequency and impact were solved first and consequently those with the least frequency and impact were resolved last.

Taking into account the conclusions stated above, we decided to make a decisive move and improve our product, so that the user has a better overall experience while using our application.

In order to improve our application based on the previous evaluations given by our experts, we redesigned our User Interface to make all the interactive elements logically arranged and hopefully solved the problems they found.

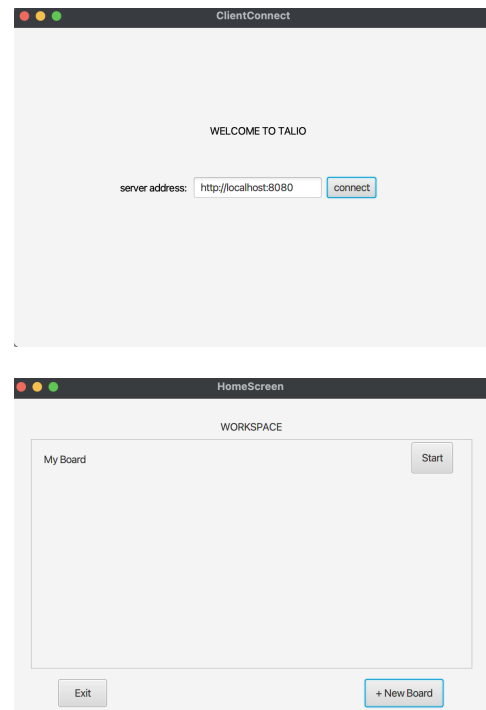
Firstly we added the functionalities that they pointed out

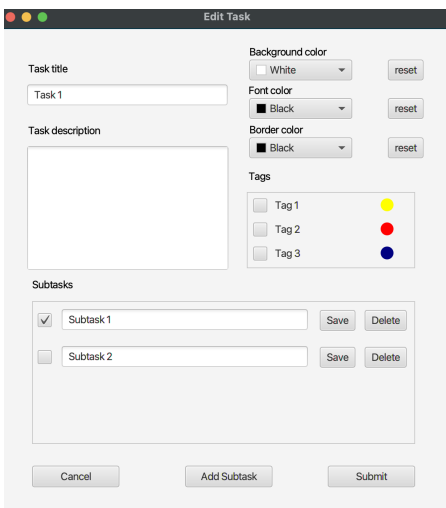
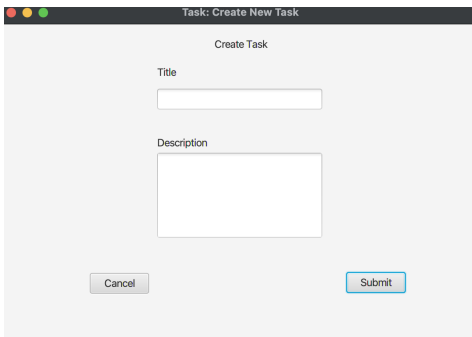
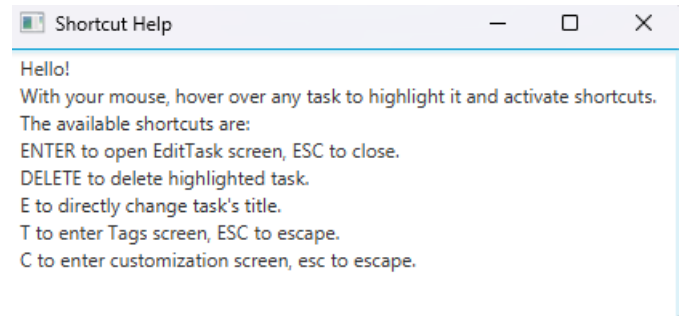
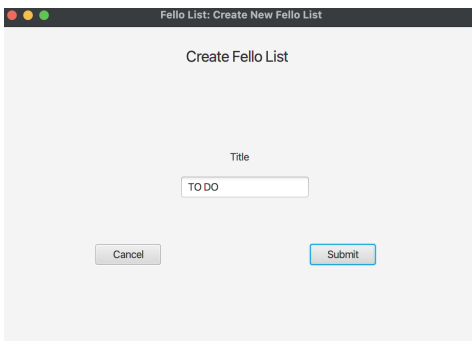
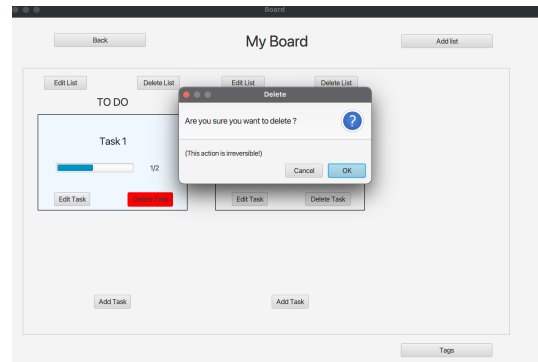
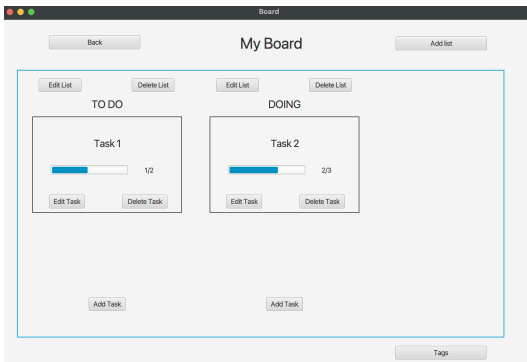
were still missing such as the edit list, edit board, and enter a URL to select which server to connect to among others. Alongside this, we added more clear text and images inside of the different buttons to indicate their functions as well as relocating them to positions which is more easily recognized to which attribute in the page are they connected. Furthermore, we also implemented a confirmation box that pops up whenever a user clicks on a delete button, ensuring that they are aware of the action they are about to take and prevent accidental deletion of important data. Additionally, we added a help scene that provides users with instructions on how to use the application and its shortcuts, making it easier for users to navigate and use the application effectively.

These changes represent a significant overhaul of the application's User Interface, aimed at improving the overall user experience and addressing the issues identified by our experts. We believe that these improvements will make our application more accessible to a broader user base and increase user satisfaction, ultimately leading to a more successful product.

Lastly, we also modified the aesthetics of the interface to make the pages more visually appealing to the users, these changes include resizing the lists so that the tasks can properly fit inside of the lists and removing the shadow from the text in the list's title to name a few.

This is the state of the application after the issues were considered and most of them, solved.





After these changes have been realized, we expect the application's User Interface to improve from how it was originally presented to our experts in order to better satisfy the users of our application. We believe that by receiving the evaluation from our experts, we were able to find and solve a lot of issues that had gone unnoticed previously.