OOP Project Heuristic Usability Evaluation Report – Group 69

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1 INTRODUCTION

This paper reports on a Heuristic Usability Evaluation [3] that was performed for the Talio application of the Object Oriented Programming Project (OOPP). The objective of this evaluation is to find and reflect on usability problems in the Graphical Interface of the application. We will then report on how we attempt to solve these issues, in order to improve the overall usability of the application.

1.1 Prototype

The evaluation in this paper is based on a mockup prototype of the interface of the Talio application. The prototype shows how the application will appear and function [3]. The prototype was developed using the online platform Moqups [2]. It shows the general appearance of the UI using geometric shapes, images and text. Figures 1-9 show each screen of the prototype, along with a description of what it is, how it relates to other screens and how it would function.

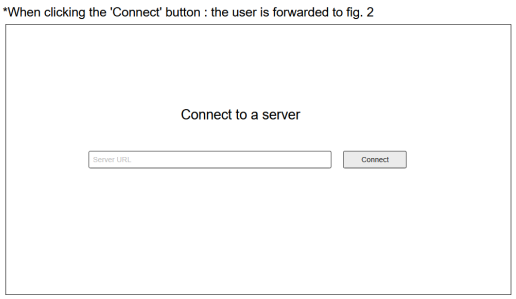

Figure 1: Choosing a server - opened when the application is opened for the first time and when the server settings button from figure 2 is pressed

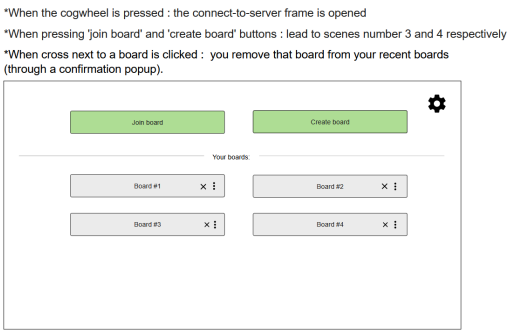

Figure 2: The home frame - the screen that is shown after the user has connected to a server

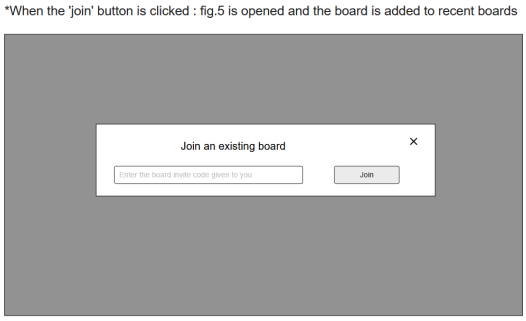

Figure 3: The join board frame - opened when the button 'join board' from fig. 2 is clicked

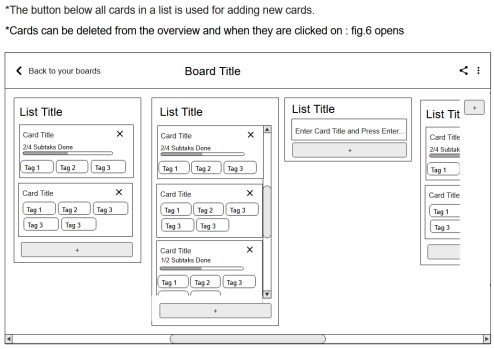

Figure 4: The create board frame - opened when the button 'create board' from fig. 2 is clicked

2 METHODOLOGY

The evaluation of the user interface was done by a small set of independent evaluators, the would examine the prototype and report anything they saw, that did not comply with a set of "recognized usability principles" [3]. The evaluators were the members of Group 43. Just like us, they are first-year students in the age range of around 18-22. Thus their technical experience is similar to ours. Them being a group of culturally diverse individuals, we believe will improve the quality of the evaluation by recognizing a more varied set of usability problems.

The evaluators were instructed to examine the app at least twice, more if they needed to [3]. The first time, they were to focus on the overall flow between the screens of the application. In any further passes, they would be able to focus on the details of particular elements and how they fit in the bigger picture. They were to report on any problems that they encountered pertaining to any of the ten heuristics [3][1]. They were to identify each individual problem and write down each problem according to a template, that includes what the problem is, which heuristic it corresponds

*The button below all cards in a list is used for adding new cards.

*Cards can be deleted from the overview and when they are clicked on : fig.6 opens

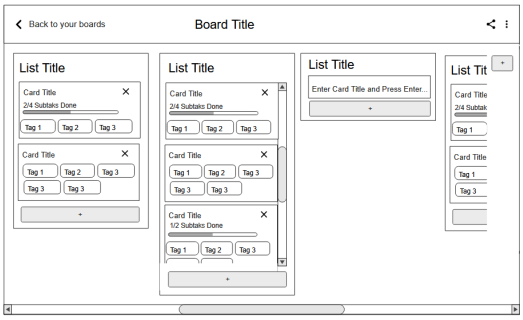

Figure 5: The view board frame - has a button to add a list, a button to open the share popup (fig. 8), a button to open the board settings (fig. 7 and all of the lists are displayed horizontally

*'Select a tag to add' drop-down : shows all available, unadded tags of the board

*Checking subtasks upgrades the progress bar on the card in the board overview

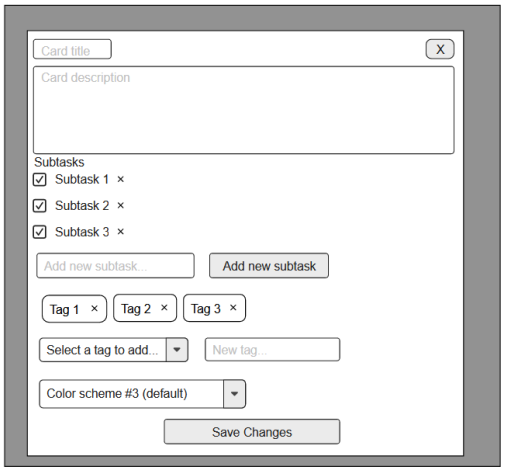

Figure 6: The card popup frame - opened after double-clicking on a card : description can be added, subtasks can be added and checks, personalized tags can be created and/or added

*Popup is used to edit / revert to default the colors of all components of the particular board

*Popup is also used for tag management

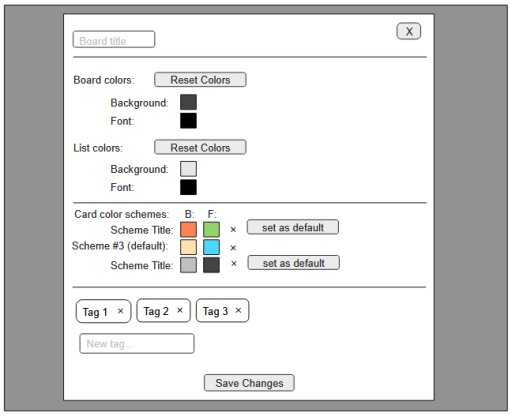

Figure 7: The board settings frame - opened when user clicks on a the "more" option either on the board frame or on the home frame

*If the user has joined through a 'read only' code, only the 'read only' code field is shown

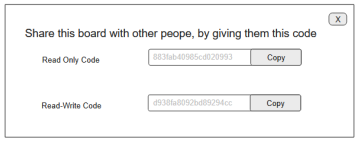

Figure 8: The share board frame - opened when the user presses the 'share' button from fig. 5 The sharing codes are displayed and can be copied

*The user can edit the color and the tag's name and save the changes

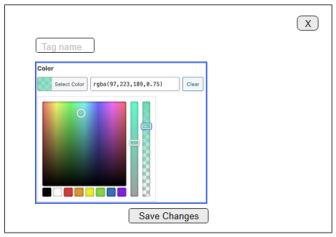

Figure 9: The tag settings frame - opened when user clicks on a the "more" option either on the tags (either from the board (fig. 5 or the card settings(fig. 6

to, what difficulties the user might experience due to the problem, what the context for each problem is, and what the likely cause of each problem is. They were to each send the evaluation of the problems that they encountered, so we can compile and analyze the problems, their frequency, their impact and their severity.

In order to ensure independent and unbiased results, as per recommendations [3] [1], the evaluators were to do the evaluations alone, with no supervision from us. Since "the system is intended as a walk-up-and-use interface for the general population"[3], the evaluators did not get any assistance from us, so that we could get better feedback about parts of the interface that users might find confusing.

In the end, five people from Group 43 submitted their evaluations. This number of evaluators is right in line with suggested

best practices for Heuristic Evaluation Reports [3]. The evaluations were all about a page or two long, and they included anywhere between 10-25 problems. All the evaluations included the heuristic that each problem corresponded to. Though, unfortunately, not all of them followed the template that we instructed them to, we were still able to extrapolate and analyze all of the problems that were mentioned in the reports.

3 RESULTS

The team of evaluators reported various problems, some of which appeared more often in the different reports. Our team compiled those into unique problems, which we have grouped, according to the heuristic they belong to [3]. We have categorized them with impact and frequency scores, on a scale from 1-5, where 5 is the most impacting/frequent [1]. The frequency takes into account both how many evaluators reported the problem and how frequently users might experience it. The impact score represents how much of an issue we think the problem will be, when it is encountered. Within each heuristic group we have ordered the problems, with regard to their impact and frequency scores.

3.1 Visibility of system status

3.1.1 Board Permission Indication (Impact – 4, Frequency – 2). It was reported once that the user cannot distinguish whether the board they have joined is read-only or read and write. The impact of the problem is significant even though the frequency is not.

3.1.2 Server Connection Icon (Impact – 3, Frequency – 2). A problem that a reviewer discovered was that the 'change server connection' button's icon is not intuitive for the user. Only a single evaluator reported that, so the frequency's score is low. The impact of the issue is not high since the problem would not cause issues for the users.

3.2 Match between the system and the real world

3.2.1 Color Picker (Impact – 3, Frequency – 3). Two of the evaluators reported that the color-picker tool is not user-friendly. They recommended using hex codes instead of RGB values for the colors and also stated that "color scheme" is not a particularly user-friendly term. This problem occurs whenever the user does some type of customization, so the frequency is high, but only two evaluators mentioned it. This problem does not prevent the user from using the application properly, but it is also not negligible, so it is somewhat severe.

3.3 User control and freedom

3.3.1 List Deletion (Impact – 5, Frequency – 4). There is no button that deletes a given list. This is a severe oversight and it is something that almost all users will encounter at some point.

3.3.2 Reverting Changes (Impact – 3, Frequency – 4). Four out of the five evaluators reported the inability to reverse accidental changes that they have made. This is not critical to the operation of the interface, but it is something that almost all users would like to do at some point.

3.3.3 No way to edit sub-tasks (Impact – 2, Frequency – 4). Once sub-tasks have been added, the user cannot edit them. A workaround would be to delete the sub-task and to add a new one. Hence it is not a severe issue, but it is something that the user might want to do frequently.

3.3.4 Edit Protection (Impact – 4, Frequency – 2). There is no way to set, change or remove the password of a board, but only an invite code with or without edit permission. We recognize that it would be good if the user could revoke those edit permissions.

3.4 Consistency and Standards

3.4.1 Board Settings Color Wheel(Impact – 3, Frequency –3). It was also pointed out that we do not have a button in the board settings referencing to the color wheel. We considered this to be a somewhat severe problem as it could cause some confusion for the user.

3.4.2 Button Icon (Impact – 2, Frequency – 1). It was also mentioned that we should change the "X" with something more intuitive. This is not a severe problem as it will not cause any errors or confusion.

3.5 Error prevention

3.5.1 Data Validation (Impact – 5, Frequency – 3). Validation needs to be done for empty fields of a card (Figure 6), and in a similar manner for tags (Figure 9), lists and boards (Figure 4). If an empty field is entered in the DB, this may lead to a severe error. It can occur if the user is inattentive or tests for flaws in the application, thus it is likely to happen.

3.5.2 Difficult Input (Impact – 4, Frequency – 4). Errors are likely to happen when inputting fields. It is possible that the server address (cf. Figure 1) does not correspond to any URL, and the user can be unfamiliar with its structure. Likewise, the board code (Figure 3) consists of a long hexadecimal string, which leads to typing mistakes. The user will encounter these two inputs frequently, and it will considerably harm usability.

3.6 Recognition rather then recall

3.6.1 Indicate Card's Description (Impact – 1, Frequency – 4. A commonly reported problem was that the user is not able to see whether the cards have descriptions, and if they do, what those descriptions are. This would be encountered by users often and was reported multiple times, but it is not a severe issue.

3.6.2 Add List Button (Impact – 1, Frequency – 3). The "add list" button is considered not intuitive enough by one evaluator. It could be more descriptive other than just being a plus symbol, but it is not severe. It is frequent by being on the board overview.

3.7 Flexibility and efficiency of use

3.7.1 Edit List Titles (Impact – 4, Frequency – 5). A reported problem was that titles of lists are unalterable. This issue is common since four out of five evaluators reported it. It limits the usability, therefore it is also of high impact.

3.7.2 Absence of Admin Control (Impact – 5, Frequency – 1). An evaluator noticed the severe problem which is the lack of an admin

control page. This issue is of high importance and impact, even though it was recognized only once and only affects administrators.

3.7.3 Lack of Keyboard Shortcuts (Impact – 3, Frequency – 5). A problem that was reported was the lack of keyboard shortcuts. This issue is considered frequent since all reviewers reported it. It is not of highest impact since it does not inhibit the functionality of the application.

3.8 Aesthetic and minimalist design

3.8.1 Tags in Overview (Impact – 3, Frequency – 3). One evaluator said that the card should not display the names of the tags. The problem is still frequent as most users will look at cards in the overview. The names of the tags can be distracting in the overview, so the problem is somewhat severe.

3.8.2 Excessively Detailed Frames (Impact – 2, Frequency – 4). An evaluator reported that the frames 6 and 9 are too detailed and appear too complicated for the user. This would be a frequently encountered issue by the users although it was only reported once by the evaluators, but it would not affect the functionality of the app.

3.9 Help users recognize, diagnose, and recover from errors

3.9.1 Absence of Error Messages (Impact – 4, Frequency – 3). The absence of error messages when the user does something wrong is severe, since the user might think nothing is wrong when there is actually an error. It would occur mostly for data validation.

3.10 Help and documentation

3.10.1 Lack of Help Page (Impact – 3, Frequency – 3). A problem that occurred in all of the evaluations was to lack of a help page that should guide the users through the shortcuts and the different functionalities of the buttons. This will only affect users who do not understand how the application functions or who want to learn the shortcuts, and does not affect the actual functionality, hence it has medium impact and frequency.

3.11 Conclusions

From these results we can see that problem have been reported in all ten of the heuristics with an average of two problems per heuristic. Impact and frequency scores have been assigned to each issue, thus they can now be prioritized and necessary improvements can be assigned.

4 IMPROVEMENTS

After analysing the results, we have compiled a number of improvements, in order solve to the issues raised by the evaluators. These include adding new functionalities, making the interface easier to understand and use for the intended users. For each improvement we have cited exactly which problem it corresponds to. The improvements are listed in order, according to the severity of the problems, which was judged based on the frequency and impact of the problem.

(1) 3.3.1 Being able to delete lists is a very important functionality, which is why this issue is a top priority. To fix this, we will add a button next to the title of every list, which deletes that list.
(2) 3.5.1 The lack of data validation can lead to critical server errors if it is not done on the client side. As a solution, the validation of data fields will be done and information popups will be shown should the data be invalid, for instance an empty title for a board.
(3) 3.5.2 The impact of difficult inputs on usability can be minimized. We will have a default server connection button which inserts an address corresponding to localhost. For board codes, we will use password and code instead.
(4) 3.9.1 The lack of error messages can considerably affect usability but are not critical. We will add error messages when the user does something not allowed.
(5) 3.7.2 The absence of admin control panel is of high priority by having the highest possible severity. A solution to the problem would be having a button by which a user can enter the admin mode with a password.
(6) 3.7.3 Implementing shortcuts will be prioritized in such position because it is not an application-breaking problem but it will still significantly improve the efficiency of the application. We intend to add several shortcuts.
(7) 3.3.2 Accidental changes happen often and they can be irritating. We will fix this by adding confirmation popups to any buttons that delete something from the board. We will also add cancel buttons to card and board popups.
(8) 3.3.3 Editing sub-tasks is not of the utmost importance, but it is a common use-case. Thus, we will add the ability for the user to click on a sub-task to edit its name.
(9) 3.1.1 The lack of indication whether a joined board can be edited is of not of the upmost priority, but we still consider it to be significant. An improvement that will be made is to add an icon of a lock that is locked or unlocked to indicate the permission.
(10) 3.8.1 The tag titles in the card overview are indeed not needed and can significantly distract the user, hence the priority. We will remove the tags' titles from the final product and we will only leave their colors on the card overview.
(11) 3.3.4 Being unable to revoke edit permissions of a board is not a very severe problem, but we plan to address it, by either implementing a more standard password-protection system, where one can change the password of a board, or by giving users the ability to revoke the any invite codes with edit-permissions and generating new ones.
(12) 3.8.2 The complex design of the mentioned frames is prioritized in this position due to its higher frequency and lower severity, thus the frames in question should be simplified and made more understandable for the user.
(13) 3.2.1 The color picker is not an application-breaking problem, but it has enough of frequency and impact to justify this priority. We are going to display both hexadecimal values and RGB ones in the color-picking tool. We could not find a more suitable term than "color scheme", thus that will not change.

(14) 3.1.2 We consider the lack of intuitiveness of the server connection icon to be a minor issue. It will be fixed by selecting a more appropriate icon to substitute the current one.
(15) 3.4.1 Fixing the colors for the board is located in the middle of the list because it has a high frequency, albeit not very severe. We have decided to make it possible to access the color wheel for both the board and list customization
(16) 3.6.1 Due to the low severity of the problem, we consider this to be an issue of low priority, but an icon to indicate whether there is a description in the card will be added.
(17) 3.10.1 Having a help pages is relatively low priority, since our focus is on making the app as intuitive as we can. However, we will have a README file, explaining a how to use the application, and we will also add a popup showing the keyboard shortcuts, so that the user does not have to memorize them.
(18) 3.4.2 Changing the icons of the buttons is very low priority in out list. In the final product we have decided that we will use the "bin" icon for permanently deleting from the server and the "X" only for client deletion.
(19) 3.6.2 The add list button is used frequently, but it is barely a problem, hence the lowest priority. We will not change the button, as we think its placement and icon are intuitive enough. The only thing that we are going to add is tool tip on hover.

4.1 Improved User Interface Design

Here we will present a new GUI, that takes into account all of the improvements that we came up with.

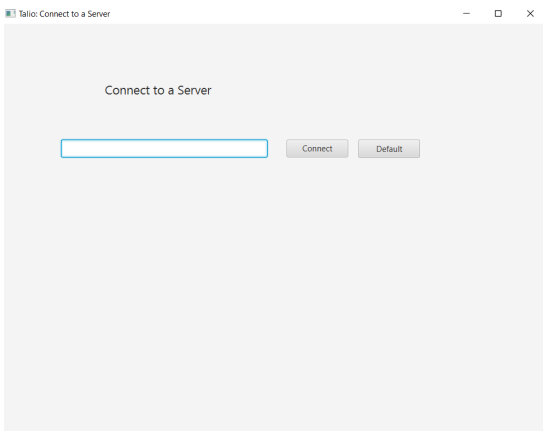

Figure 10: Choosing a server - opened when the application is opened for the first time and when the server settings button from figure 11 is pressed. The only improvements here are design changes and the "default" option.

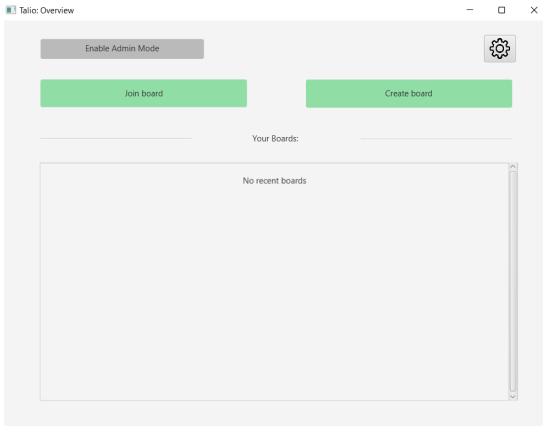

Figure 11: The home frame - the screen that is shown after the user has connected to a server. The biggest improvement here is the option to use the application as an admin.

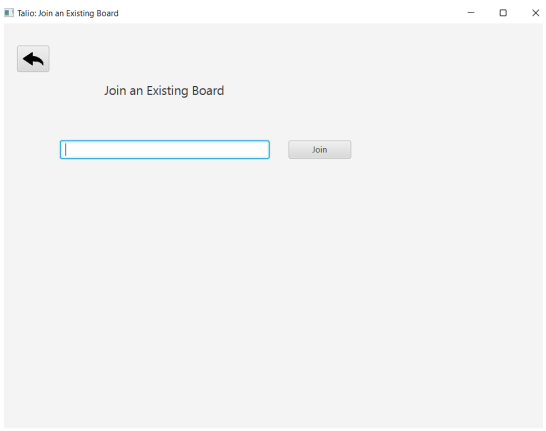

Figure 12: The join board frame - opened when the button 'join board' from fig. 11 is clicked. Instead of a pop-up, this is now the entire new screen.

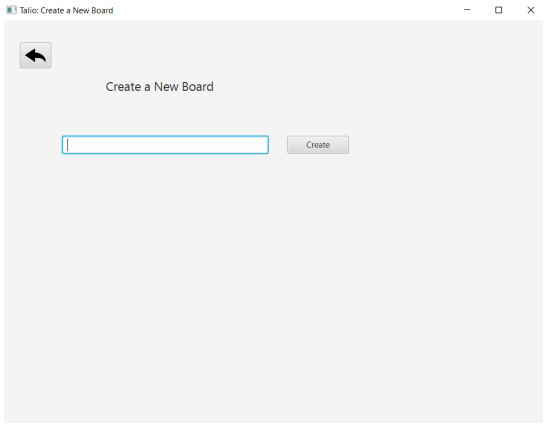

Figure 13: The create board frame - opened when the button 'create board' from fig. 11 is clicked. The improvements here are the same as fig. 12.

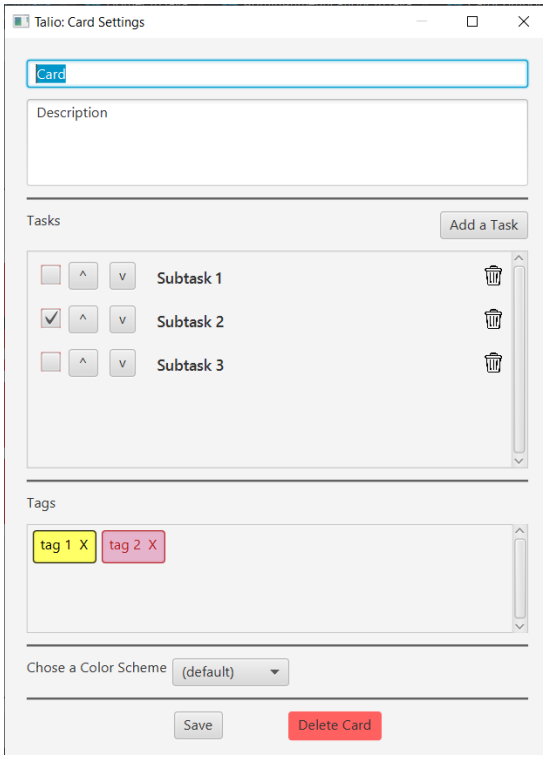

Figure 15: The card popup frame - opened after double-clicking on a card : description can be added, subtasks can be added, marked as (un)completed and reordered, personalized tags can be added. This screen was simplified, so that the user can work easier with it.

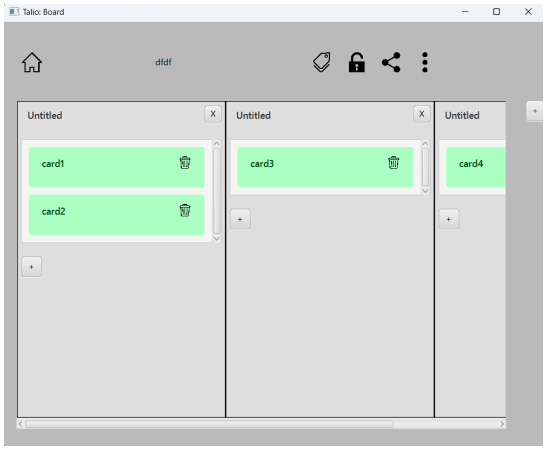

Figure 14: The view board frame - has a button to add a list, a button to open the share popup (fig. 17), a button to open the board settings (fig. 16, and a button to open the tag settings (fig. 18, and all of the lists are displayed horizontally, together with their cards. There were a lot of design improvements on this screen.

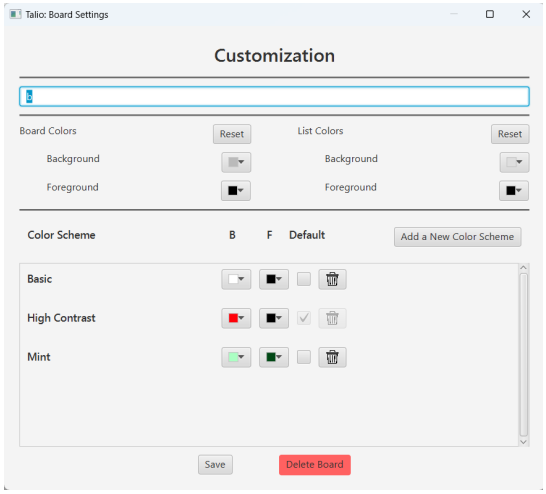

Figure 16: The board settings frame - opened when user clicks on the "more" option either on the board frame or on the home frame. This screen was also simplified as much as possible.

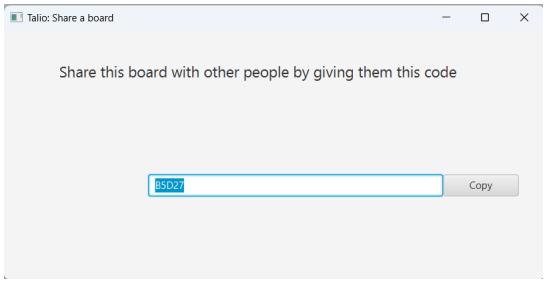

Figure 17: The share board frame - opened when the user presses the 'share' button from fig. 14 The sharing code is displayed and can be copied

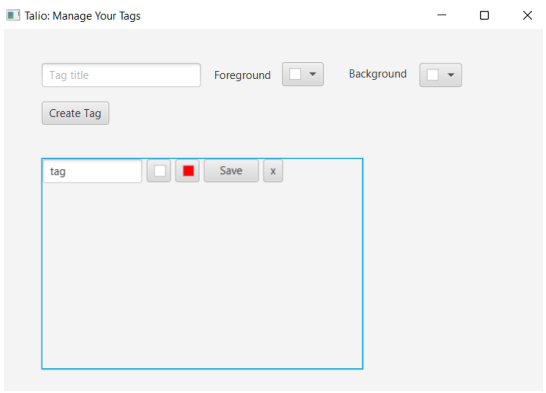

Figure 18: The tag settings frame - opened when user clicks on a the "tags" option on the board (fig. 14. Now tags are both created and edited from this screen.

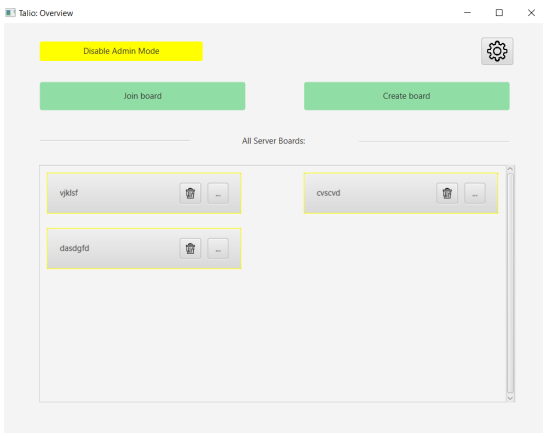

Figure 19: The admin version of home control - opened after clicking the "Enable admin mode" button from the home controller and entering the correct admin password.

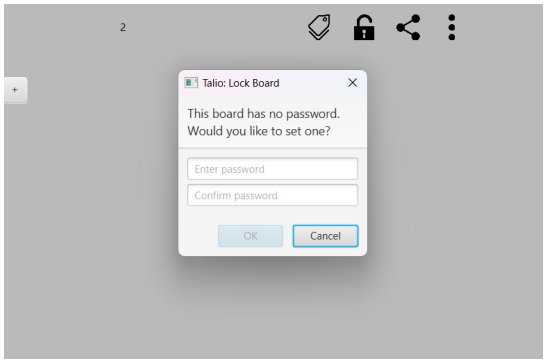

Figure 20: Set Password is shown when the board does not have a password already.

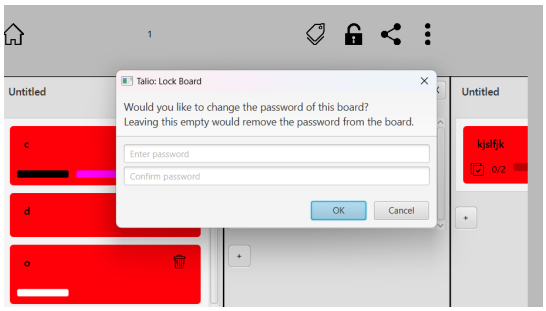

Figure 21: Change Password is shown when the board already has a password and is changed by someone who unlocked the board.

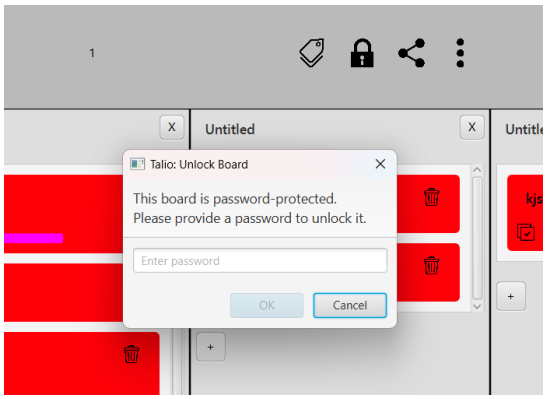

Figure 22: Unlock is shown when the board has a password and the user has not unlocked it yet. After unlocking, the user can make changes to the board.

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[1] TU Delft Human Computer Interaction. 2021. History of heuristic evaluation. (21 1 2021).
[2] Moqups. 2023. *Moqups - Wireframe, Diagram Whiteboard Online.* https://moqups.com/
[3] Jakob Nielsen. 1994. How to Conduct a Heuristic Evaluation. *Nielsen Norman Group* (1 10 1994).