### **1 INTRODUCTION**

In this document we summarize the findings of a usability evaluation based on our low fidelity prototype interface (Bias Reporting System), a web application that is designed for individuals at the University of Alberta’s. Our objective is to better understand the usability of the user interface, which has been accomplished by considering the potential user challenges, our own assumptions about the user, and the context of their needs. By utilizing the usability heuristics and the four design principles: contrast, repetition, alignment and proximity (CRAP), we will be able to better understand the user’s needs and the challenges the user experiences by providing alternative strategies and solutions which will help improve the user’s experience. The usability heuristics and principles are summarized in Table 1.

Table1: Nielsen’s Heuristics and the CRAP Principles

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Neilsen’s Heuristics | | | | | CRAP Principles |
| * System status should be visible * System matches the real world * User control and freedom * Consistency and standards * Prevent errors | | | | * Promote recognition over recall * Flexibility and efficiency of use * Aesthetic and minimalist design * Help users recognize, diagnose, and recover from errors * Provide help and documentation | * Contrast * Repetition * Alignment * Proximity |

By recognizing the interface’s intended users and the system’s functionalities, we can identify the usability and/or design principles that have been violated. Based on our assessment of the interface we can utilize the severity scale to measure our identified issues to provide alternatives solutions to redefine the interface in a way which will help overcome the usability issues and foster the user’s effectiveness of the interface.

#### **1.1 Intended Users**

The intended users of this interface have been classified as individuals at the University of Alberta. More specifically, individuals who have experienced or observed bias can initiate a bias report about their university experience. These individuals (Reporters) can be considered as students(undergraduate, graduate), research/teaching assistant, professors or any other individuals that are associated with the University of Alberta. Moreover, the second type of individuals that the interface interacts with are recipients. This group of individuals (Recipients) consists of individuals with a higher level of authoritative status at the institution such as department chair, professors, deans, advisors, lead research/teaching assistant etc. This type of individual will be receiving reports of experiences affected by bias, in order for them to act on it and make the changes required. Therefore, the application must be simple and easy to interact with to attract members of the general population.

#### **1.2 System Functions**

The Bias Report System (BRS) consists of many common functionalities for both users. The common functionalities between both users have been indicated as the ability to create a new report, save/edit/delete and submit a report, view a list of submitted and drafted reports, the ability to create a new account and log in/logout. Meanwhile the recipient has a few more additional functionalities such as the ability to view a list of reports submitted to them, view the details(name,date,time and description) of each report and have the ability to change the statuses of each report accessible to them.

**2 HEURISTIC EVALUATION**

#### **2.1 Nielsen's Heuristics**

The evaluation of the Bias Report System (BRS) has been completed with the consideration of the Neisen’s heuristics and the CRAP principles. With the use of the heuristic severity scale,each concerning issue found from our assessment of the evaluation can be elaborated below:

|  |  |  |
| --- | --- | --- |
| **Scale** | **Description** | |
| 0 | I don't agree that this is a usability problem at all | |
| 1 | Cosmetic problem only: need not be fixed unless extra time is available on project | |
| 2 | Minor usability problem: fixing this should be given low priority | |
| 3 | Major usability problem: important to fix, so should be given high priority | |
| 4 | Usability catastrophe: imperative to fix this before product can be released | |
|  |  | |

[Severity Ratings for Usability Problems](https://www.nngroup.com/articles/how-to-rate-the-severity-of-usability-problems/)

##### **Consistency and Standards**

A few violations in regards to the consistency and standards heuristics would be the inconsistent choice of labeling. The lack of report status visibility can be seen on the landing page screen for both reporters and recipients. There may be instances where users can be confused on the status of a report upon viewing a list of all reports. As this impacts both users we have considered this violation with a heuristics rating of 2. This can be addressed by having a report status field or color indicator for each applicable report.

Furthermore, in the “Landing Page - All Reports”, users will experience some difficulties differentiating a new report in comparison to all the other reports on the same screen. This issue has been perceived with a heuristics rating of 2. To eliminate confusion, user’s tend to apply rules to what they’ve experienced on previous platforms, therefore some sort of icon/text indication would be helpful to differentiate between what is new and what is not new would be beneficial for the users.

Lastly, there is very minimal indication whenever the search field is available to the user. As the design and layout of each screen is consistent, we should leverage the user’s cognitive ability by utilizing the magnifying glass (icon) and pre-filled text to help the user establish their previous convention of an interface. As of currently, we have classified this violation with a heuristics rating of 1.

##### **User control & Freedom**

Upon signing up or logging in, the user is displayed a dialog that consists of input fields to allow the user to complete their actions. However, this dialog can trap some users as it would limit some of the user’s functionality by not allowing them to navigate out of the screen. This can be considered as a minor usability problem heuristics rating of 2. A solution to this would be to integrate a close window icon on each dialog. This will allow the user to have the ability to escape from the window and create the user with the sense of freedom within the interface.

Another area where there exists opportunity for improvements, is when the user deletes a drafted report. Currently, there is a dialog window that confirms with the user their intent to delete the draft report, however there is no availability for the user to undo it. We have set this type of violation with a heuristics rating of 2. By supporting the user with an undo or redo option, the user will be able to recover from the actions they have committed .

##### **Aesthetic and Minimalist Design**

In the “Drafted Landing Page”, when a user action is to delete multiple drafted reports, the user must access one report at a time to accomplish their task. This may be overwhelming to some users that have a high number of drafted reports which they desire to delete. This has been considered as a heuristic ranking of 3. A solution to this would be to allow the user the ability to select more than one report within the drafted landing page, and display a window dialog with the number of selected reports and ensure that the user is aware of this action.

##### **Recognition over Recall**

A violation of recognition over recall that was found is the lack of ability to access reports easily. This requires the user to remember exactly where to find and what they want. Upon assessing the interface, we have perceived this with a severity ranking of 2. This can be resolved by designing the system to assist the users to recognize over recollect. Specifically, we can provide functionality where the user can type in segments of a keyword and allow the system to return content that is populated with portions of the keyword(s) the user is searching for. In addition, we can employ a design principle such as proximity(grouping) to place the related elements near each other.

##### **Visibility of system status**

We have not indicated what event will occur after a user clicks the “Yes” or “No” button, upon deleting a report, submitting a report, and saving a report as a draft. It is important that the user knows the success or failure of their actions within the system. To reflect the accurate system status, we will implement a confirmation message or failure message, depending on whether or not the user’s action was successful or unsuccessful. Because the user anticipates a confirmation message upon sending a report, or failure message upon failure, they may be confused when this feedback is not received, which may lead to the user sending double reports, or not having a report go through. Based on this reasoning, a severity ranking of 2 is given to this problem.

Furthermore, both a receiver and reporters dashboard can be improved with respect to the visibility of a system status. Both users rely on visual feedback on their dashboards. To ensure a user can trust that the system has updated after they have closed/processed a report, received a new report, submitted a report, or had a report they submitted closed, the dashboard should include a “last updated on: <date:time>” tag, to let the user know what information the dashboard is reflecting. This will allow the user to see whether or not the system has updated since the last relevant event, therefore reflecting the visibility of a system status. The dashboard is still operational, independent of the status being reflected back to the user, therefore, the severity ranking given to this problem is 1.

The visibility of a system status is violated by the lack of indication of what page a user is in within the application. Although each page a user would be visiting within the application is obvious to us as the designers, this is not necessarily the case for the users. For example, if a user clicks on “My inbox” in the sidebar menu, the inbox page does not have a title that says “My Inbox”, and this is the case for all pages in the application. The current page can be inferred by the content of the page and the url - however we do not expect our users to always make accurate assumptions, and we do not expect our users to understand relative pathways in the url. To ensure our users are not confused about the current page they are visiting, we will include a title on each different page. This verifies that the system's status based on a user’s intended navigation is reflected back to the user. Because the user is still able to make inferences based on a pages content, the severity ranking given to this problem is 1.

##### **Match between system and the real world**

A violation of matching the system to the real world exists within our current design. This violation is seen in the buttons on a confirmation message when saving a draft, deleting a report, and sending a report. The “Yes” button is red, and the “No” button is green. This does not conform to a typical user's worldview which is to use the metaphor of green for confirmation/”go” and red for denial/”stop”. To fix this violation, the button to represent a negative confirmation, in this case “No”, should be changed to the color red, and the button to represent positive confirmation, in this case “yes”, should be changed to the color green. Because this cosmetic feature does not negate the functional use of the buttons, it is given a severity ranking of 1.

##### **Error prevention**

In terms of error prevention, there is room for improvement. We do inform the user upon signing up that they need to have a valid University of Alberta email. There is unfortunately no mechanism preventing a user from inputting a University of Alberta email that belongs to another University of Alberta member and spamming their email inbox with confirmation emails. This error can be prevented by implementing Oauth 2.0 redirect practices that will redirect a user to their University of Alberta login to confirm their University of Alberta email. This error prevention problem is given a ranking of 2 because of its security implications.

Furthemore, we have not indicated in our prototype what will happen upon clicking the logout button. To ensure that the user intends to logout and therefore prevent an unintended action after an accidental click, the applications next design iteration will include a confirmation upon a user clicking the logout button. Because a user will still be able to log in after an accidental logout, this problem is only given a severity ranking of 1.

##### **Flexibility and Efficiency of Use**

Something that can be improved upon is having good default values, which is an accelerator. In the report creation page, the date can be automatically set to the current date so that the user can possibly skip a step that they would otherwise have to manually input, and avoid omitting important details of a report. There could also be an autocomplete or drop down feature to select recipients rather than typing the entire recipient as the user. The severity ranking for this heuristic is 2 because although the lack of default values is not detrimental to the systems usability, there exists the potential to omit certain values that would be important for a receiver to know about when processing a report.

##### **Help Users Recognize, Diagnose and Recover From Errors**

Something that can be improved is adding additional information for the pop up checks. For example, the “are you sure you want to delete” pop ups can additionally state that the report will be lost forever and make sure the user is okay with that. For the save draft pop up, there should be additional information saying that the report is not being submitted and then being sent to the draft area. For sending the report, there can be additional information saying that there is no way to un-send it and to double check before sending the report. The severity ranking for this would be 2, as it would not cause large problems, but would be very helpful.

##### **Provide Help & Documentation**

This heuristic is about the ease of the user using the system independently, and as a last resort with documentation. The search bar does not have a label indicating it is a search bar, so that should be added so that the user can find out without consulting documentation. The system does have text descriptions on empty text boxes which helps the user know what the required input is. Something that may be difficult for the user to find is the delete button as you have to navigate into the report first. Having an option to do it while viewing the list of reports can help the user with an alternative location to delete. Having back buttons on every page is an addition that should be considered so the user does not get stuck on a page and can easily navigate backwards, although the user is able to go back via the browser. There are not many areas of technical confusion asides from the actual report writing, which can be remedied with an example template, or even an example within the text that appears on an empty text box. The severity ranking for this heuristic would be ranking 2.

Another area where this heuristic has been violated is within the “SignUp” section of the interface. There is currently no feedback/indication that the user has inputted the same password twice or if the user has achieved the requirement of the password validation. This violation can be addressed with a severity rating of 2. A suggestion on how to resolve this issue would be to display and assist the user of the changes that are required of them. To do so, this can be done by displaying to the user if both inputted fields don’t match. This will inform the user of changes that will be required prior to them proceeding with their actions. In addition to the password input, having the password validation modal displaying what the user has accomplished with the required input will help the user immensely.

#### **2.2 CRAP Principles**

##### **Contrast**

The web applications contrast was assessed using WebAIM’s contrast checker[[1]](#footnote-0). Although our web application provides the opportunity to change the UI’s graphical components, we can improve our UI by having the default colors subscribe to appropriate contrast ratios. The tools that WebAIM provides allowed us to determine what graphical components our user interface needed to be altered to make the website accessible for all possible users, and meet web accessibility standards. For the majority of the applications users this may be simply a cosmetic issue; however, for a small user population the contrast issues discussed below may inhibit a users ability to use the web application as they intend to, therefore they are categorized as having a severity ranking of 3.

Firstly, the notification bubble on the sidebar background in dark mode as well as light mode (default) fails the graphical objects and user interface components contrast test. For reference, the notification bubble color is #f93535 , the sidebar background color in dark mode is #a7a7a7 , and the sidebar background color in light mode is #ffffff . An alternative default notification bubble color would be #3d2db4, which would satisfy contrast checks for both the background color in dark mode and light mode.

Secondly, our “see more” button, “Add Comment” button, as well as our “save” button, have a foreground color of #ffffff, and a background color of #18a0fb . This fails both the normal text and large text tests in WebAIM’s contrast checker. And alternative button background color would be #016011, which passes both the normal and large test checks.

Importantly, our data visualization colors do not supply sufficient contrast for all users. Having a foreground color of #4762ef and a background color of #c4c4c4, does not pass the graphical objects and user interface components test. To accommodate all users, we intend to change the data visualization progress bar to a different color such as #1b0a99 or #82276e. These suggested colors will not only pass the graphical objects and interface components test, but will also elicit the same subjective response intended by the current bright blue color.

##### **Repetition**

The CRAP principle of repetition could be improved in our low fidelity prototype of the web application; however, usability problems will not result from the existing design with reference to repetition. Therefore, both examples below are given a severity ranking of 1.

With respect to violations of proper repetition practices, an argument could be made that the sidebar creates a division between elements that are related to each other functionally. There is no overarching difference that exists between the elements on the top which are “Recent Activity”, “All”, “Dashboard”, and “Closed Reports”, and the elements on the bottom which are “My Inbox”, “My Drafts”, “My Submissions”, and “Create New Report''. The elements above in the four boxes do not necessarily have a priority over the bottom listview elements, and all share the functionality of navigating to a different page in the web application upon click. Altering the sidebar to have all elements in a list view as the bottom half or have all elements in a rounded square as the top half will enhance the clarity of the design.

Furthermore, the typeface for most buttons does not match the typeface that is used by the rest of the applications, and some buttons have different text sizes relative to their neighbour buttons. In our next design iteration, to adhere to proper repetition practices we will change the buttons to have the same font style, as well as the same text size relative to each other.

##### **Proximity**

The proximity in the current prototype is present, although there are a few areas of improvement. The concerning areas are very minor and do not affect the usability, so the severity ranking for the changes would be 2.

The recipient’s dashboard view has the different report types very far apart. This can be improved by putting them closer together horizontally, and having more white space between them and the sidebar. Currently there is not a clear distinction between them and the sidebar in horizontal space. In the settings page, the labels and respective information are a bit far from each other but close to its own group. This makes it a bit confusing for the user because it is a little difficult to perceive which label corresponds to which respective state. This can be improved by slightly increasing the distance between each individual group, for example the distance between labels, and then decreasing the distance between a label and its respective state in order to strengthen the associations. There should also be more space between the page name from the page content, as it is currently close and difficult to distinguish between.

##### **Alignment**

There are areas that can be improved upon for alignment. The alignment issues do not affect usability much, but are many in quantity and would improve the quality of life, so the severity ranking would be 2.

In the pop up window for success on sign up, the message can be bound by location of the x symbol, as it is currently going past that. In the left side bar, the icons and text inside of the buttons are not aligned consistently. This can be improved by making all the text a certain size where they can fit in the button and be able to be aligned with the icon from the left side as an example. In the box below the top buttons in the sidebar, the contents are off center, which can be remedied by horizontally and vertically centering it. The horizontal alignment of the system in general can be improved as there are many inconsistencies. One example is that the search field is misaligned with the list of reports in the landing page, so making them all aligned along with the button above the list would make it more organized. The save and send buttons in the report submission page are not aligned properly. Possible solutions for that would be to distribute them more evenly across the space, or align them with the left and right edges of the report text box. The delete button can also be aligned better, either with the subject box or the body rather than the arbitrary current location. For the “Are you sure you want to delete this report” pop up, the pop up window should be centered on the screen, as it is currently towards the bottom right. The add comment button can be centered. In the recipient’s dashboard view, the icons should be horizontally aligned. In general, a consistent horizontal and vertical alignment should be noted for all pages. There are also some slight alignment issues in the settings page between the labels and their respective information, which can be remedied by fixing the vertical alignment.

### **3 CONCLUSION**

The methodology of using a heuristic evaluation provides a standardized way to assess and analyze a web applications interface. Performing a heuristic evaluation on our low fidelity prototype emphasizes our design flaws and how we should change them in the next iteration of our prototype. Furthermore, this assessment provided valuable insight into what user types require certain features to be altered.

The two most violated heuristics are consistency and standards and visibility of a system status, both resulting in a total of 3 violations found overall in our assessment. The heuristic with the most severe ranking is aesthetic and minimalist design with a severity ranking of 3. The largest number of violations found consists of alignment, as there were many areas of improvement required, however the total severity ranking was a 2. The most severe violation consisted of contrast, due to the inaccessibility to users with color related deficiencies as severity ranking 3. The heuristic principle with the most severe violations is the aesthetic and minimalist heuristic, and is tied for most severe with contrast. In addition, the most impactful violation for the reporter role is related to the heuristic of aesthetic and minimalist design with a severity ranking of 3 due to the user only having a single way of deleting their reports without them having to access each drafted report individually. The most impactful violation specific to receivers is proximity, specifically the grouping space of the different app elements. The violations that were impactful for both users are consistency and standards, user control and freedom, aesthetic and minimalist design, error prevention, providing help and documentation, and all four of the CRAP principles. The severity ranking of all of the aforementioned is 2 in all cases.

Going forward, we are going to use the information that we gained from our assessment to address certain flaws in the web application, and improve upon existing features. It is apparent that there are certain features that are integral that we address. We are going to address these issues by starting with the most severely ranked heuristics and CRAP principles, thereafter moving to the less severely ranked design problems in the application. Addressing the most severe issues will allow us to eliminate major usability problems that exist for certain user groups, and thereafter addressing the mildly severe issues will allow us to target issues that affect both the reporter and receiver, thereby increasing the quality of the experience for all user groups on the application. Finally we will address solely cosmetic problems to increase the aesthetic pleasure that all users experience, which will allow for a refined design that takes into consideration all aspects of our analyses and all desires of the intended users of our application.

1. [WebAIM: Web Accessibility In Mind](https://webaim.org/) [↑](#footnote-ref-0)