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### **1 INTRODUCTION**

In this document we will construct the methodologies needed to design an interface (Bias Reporting System), an application intended to help individuals report instances of both individual and systemic bias that are part of their university experience. By utilizing the low fidelity prototypes to resemble the interface with a minimal aesthetic layer of design and functionalities, we will be able to better understand how our users will interact with the system. Furthermore, this will help us eliminate any major snags in the design process that could result in costly iterations during the higher levels of prototyping. Additionally, we have summarized a variety of diverse personas to better understand the different types of users that will be utilizing the Bias Reporting System. By understanding the user’s needs and challenges, we can develop alternative strategies and solutions to help improve the user’s experiences. To help us accomplish this, we have explored different optional features and design processes with respect to the usability and design principles.

### **2 PERSONAE**

Persona 1: Frank Ocean

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| Role | Background |
| Computing Science Professor | Frank has a PhD in Computing Science. He is currently 32 years old. Born in Germany, attended university in three different continents, University of New South Wales (Sydney, Australia), University of California (Los Angeles, USA) and University of Toronto (Toronto, Canada). Currently teaches at the University of Alberta since 2005. Frank was raised in a household of wealth and is quite financially successful himself. He is very social but can be pessimistic at times due to the complex nature of his job and its seemingly political requirements. His training, experience establishes him as an expert computer user with high English literacy. Preferences are given to Linux OS and touch screen tablet devices. Part of Frank’s research has strong relationships to human computer interactions and artificial intelligence. |
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Persona 2: Matina Kalcounis-Rueppell

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| Role | Background |
| Dean of Faculty of Science | Matina has a PhD in Zoology. They are currently 49 years old. Born in Edmonton, attended University of Regina (Saskatchewan, Canada), Western University (London, Canada) and UC Berkeley (Berkley, California). Currently the Dean of Science at the University of Alberta from 2019. Their training, education and experience revolves around biology of acoustic communication in bats and mice. They are considered a moderate computer user familiar to both OS and touch screen mobile devices. In addition, their English literacy is quite advanced and is categorized as an expert. Matina is well known for their leading commitment to provide authentic and inclusive experiences for individuals and communities. |
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Persona 3: Sabrina Day

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| Role | Background |
| Faculty of Science and Teaching Assistant | Sabrina is a current neuroscience undergrad at the University of Alberta. She is a 21-year-old born in China, attended University of Alberta since 2018 and is majoring in neuroscience with a business minor. In addition to her education, they have also been a teaching assistant since September 2020 for CMPUT 175 and PSYCO 275. She is quite familiar with technology as she utilizes her laptop and mobile devices for entertainment and daily tasks. As English is her second language, she is categorized with a moderate English literacy. The alternative language she is familiar with is Mandarin. It has also been noted that some of her physical limitations are the ability to perceive certain colors due to color blindness. Sabrina also requires corrective lenses. Sabrina feels like an ingroup that she identifies with is being excluded from answering questions in class. She has kept a log in an excel document of how many people from this ingroup have raised their hand and not been called on to answer, and how many peers who are not part of this ingroup have raised their hand and been called on to answer. Sabrina wants to include this excel document in a bias report and wants to ensure that reporting will remain confidential/anonymous. |
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Persona 4: Nikuel McDoit

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| Role | Background |
| Education Professor | Nikuel is a 28 year old professor in the education department at a university. She immigrated to Canada from Japan after meeting her wife while travelling. Nikuel has high low technical literacy, high english literacy, and is partially deaf which yields the perception that she has poor english comprehension. Nikuel and her family have lower economic status due to high prices for her hearing therapy which is not insured. She is generally introverted and has an optimistic outlook on life. She noticed that many opportunities and resources that are available to advance her career favor those who do not have hearing disabilities and those who have disposable income. Nikuel is excited to use the bias software because she always strives to create an inclusive environment for her students, however she is worried that the software will not provide proper accessibility features. |
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### **3 OPTIONAL FEATURES**

3.1 **Data visualization**

The purpose of data visualization is to promote the usage of the application by keeping track of the users overall reports. This visual component of data visualization (Dashboard) will be accessible to all user groups. As for the reporter, we plan to summarize the statuses of the users' reports over time. The types of data available to this user group will be the number of open and closed reports. However, the receiver dashboard will consist of the total number of received reports as “Not Started”, “In Progress” and “Closed Reports”. The purpose of this feature was to utilize the heuristic of recognition over recall, which allows the users to easily keep track of all their report statuses on a single page. In addition, we plan to take advantage of the behavioural changes through an intuitive design of the user interface by measuring the tasks achieved for each user. Overall, the intention feature was to assist with the recipients, which will be extremely beneficial for them as they may have to deal with a large amount of reports/criticisms directed to them from other students, colleagues and subordinates.

Furthermore, the data visualization will help our personaes achieve their required and additional tasks by providing a visual summary of their in application activity. For a reporter like Nikuel McDoit, having a summary of what reports have been submitted can inform her with more information about at what times throughout the month/year she is noticing bias and draw conclusions if there are external factors relating to this bias. For example, it may be the case that more bias is occurring during exam time in her lecture due to external stresses or other variabilities. Another reporter like Sabrina Day who has moderate-low english literacy, can benefit from the data visualization will help her view her list of previously submitted reports without the component of having to read through a list of previously submitted reports.

For receivers such as Matina Kalcounis-Rueppell, having a timely reference to previously completed reports is important to their external time constraints they may face in a Deans schedule. Furthermore because Matina is well known for their commitment to providing authentic and inclusive experiences for individuals and communities, they will likely be interested to notice at what time throughout the year the most bias is being reported. For example, if there is a spike in bias reporting by junior students every September, Matina may wonder what adjustments may be required for junior students to make the greatest difference for them. With both receivers and reporters being able to visualize their completed reports, it yields a feeling of satisfaction to the user which acts as an overall positive reinforcement for our web application. This will indirectly help users complete their required and additional tasks within the application by making the overall experience with the application more enjoyable.

3.2 **Accessibility Features**

The idea of accessibility features is to accommodate users with sensory disabilities and allow for customization that best suits their preferences. Users will benefit from customizable user interfaces in the application such as text size, user interface colors (including dark mode), speech to text(on, off),brightness, contrast and ability to toggle the notifications and sound on/off. Contrast is an important feature that we plan to emphasize as it ensures that user interface entities can be made more accessible, visible and differentiable for all unique users, regardless of their familiarity with technology. This aids with the heuristic of preventing errors, without these considerations some users may experience difficulties and cause major usability problems within the application.

The accessibility features will help our personaes achieve their required and additional tasks by providing the services that suit the functional needs of each user. A user with a hearing impairment like Nikuel McDoit may prefer to have a louder pitch sound notification to eliminate the worry that she will miss an update on her report status. Furthemore, a user such as Frank who prefers touch screens will likely appreciate speech to text as typing on a touch screen can be tedious. Because Sabrina experiences the inability to perceive certain colors, changing the user interface colors to ones she enjoys will help Sabrina differentiate between certain features in the UI ,which she may not have been able to as efficiently differentiate otherwise. Moreover, as we age our ability to perceive contrast between certain colors diminishes. Being able to modify contrast in the web applications interface will help accommodate users of all ages, making their visual experience with the application more comfortable. Both receivers and reporters being provided the options to customize the app to suit their accessibility needs will also help users indirectly complete their required and additional tasks within the application by making the overall experience with the application pleasant and inclusive. It would be inappropriate to develop a bias reporting software that was itself biased against certain populations.

**4 LOW FIDELITY PROTOTYPES**

A low-fidelity prototype generally consists of limited functionalities and interactions of the application. Therefore, each prototype was developed in a way to provide a quick and easy representation of high-level design concepts. Our low fidelity prototype can be viewed [here](https://drive.google.com/file/d/1Fo5DFLpVew7IEvw7BQ-y3769U_G-pMEU/view?usp=sharing), where each task and its corresponding functionalities are further explained within each prototype.

**5 STORYBOARDS**

As we are in the early stages of designing the web application, storyboards will help us to better understand the story flow of the system and how each piece works together for the user. In predicting the user’s experience within the system, we can recognize the user's interactions and create a visual sense of what is important to the user. Our storyboards can be accessed [here](https://drive.google.com/file/d/1CqMx686_15jS6nZGVmdk_L0RS55cAiWr/view?usp=sharing), where each scene is elaborated below with the users objectives.

**6 DESIGN, USABILITY, AND METAPHORS.**

We have designed the interface with consideration to the system’s intended users, their required tasks and the various functionalities that should be available on the platform. We wanted the system’s usability to be designed in a way that is effective for users from various age groups, levels of education, and digital/language literacy. In doing so, this will ensure the user develops the correct mental model of the system and their user experience. By keeping the interface design user-friendly, consistent and very minimal throughout the web application, it will allow users to learn and interact with the interface much more easily. In regards to the design of the interface, we have considered each element available in the system to visually communicate with the users. This will allow users to understand the analogy of an icon in relation to its task.

**6.1 Design and Usability Principles**

Repetition and Alignment are consistently exercised throughout our design. A list view is used to display previous reports submitted with the most recent report being displayed first. Although all of the reports may differ in content, because they are all the same object they are displayed in a repetitive fashion that align with each other vertically and horizontally so the user is aware that they are all the same item. Because the list view elements are all perceived as being of the same type, the list view also subscribes to the law of similarity.

The benefits provided by the design principle contrast were used primarily for our clickable buttons that we wanted the users attention to be brought to, as well as other important features. We would like to emphasize how the buttons that are used to save, delete, and send a report, as well as set a reports status are all of a bright and colored hue to contrast the application that is primarily grayscale. Furthermore, the notifications center is colored to indicate that there are updates regarding reports they are involved in, for both a reporter and a receiver.

Our sidebar uses the law of common region as well as the law of uniform connectedness to group together elements with similar functionality. The similar functionality that these elements share is that upon click, they all redirect a user to a different page on the web application. Furthermore, adding a sidebar allows for a clean and minimalist and aesthetic design. When the sidebar is closed, the user is not burdened with the extra information it contains that is not necessary to complete the task at hand.

Furthermore, our design conforms to the consistency and standards heuristic by placing entities within the application where a user will expect them to be. We acknowledge that a user will spend more time on other sites, than on our site, so we want to make the design intuitive by conforming to their ideas of where certain entities are in an application. Examples of these entities are the hamburger menu that toggles the side bar, the search bar, and the logout button, all existing at the top of the page. Another example is our settings page, where the name of the setting is displayed on the left hand side of the page, and the widget provided to modify the setting is directly to the right of that setting name. Our login and signup layout forms conform to the expectation of the user by having the user enter their email first, their password second, and option to send third so long as the terms of service is agreed upon.

One of the techniques that was applied to our design for the additional functionality of data visualization is gamification. We understand that our users will be university staff and students. Since they are using the bias reporting software, we also make the assumption that they will be motivated to advocate for social change. Because of this we categorize them as a disruptor. Using data visualization to demonstrate to a user their in app “progress” all strive to meet the goals of gamification which include: Increasing and maintaining user motivation, making tasks more enjoyable, and persuading the user to perform certain activities. Because the user is submitting a report and a user is processing a report, the assumption is made that the user desires to complete the task. This sets the stage for the first part of the gamification cycle. Seeing the progress bar as not full acts as incentive for the user to take actions to fill the progress bar, which would be submitting reports, and processing reports. A full progress bar in the data visualization utilizes the metaphor that a full bar is a positive achievement. The fuller a progress bar becomes, the more the user feels they have achieved, bringing the user a sense of further accomplishment, and driving their incentive to keep using the application.

Lastly, visibility of system status has been implemented for each user interaction of a report, which will prompt the user to confirm with their most recent actions. This has been added as an extra measure of security which would allow the user to visualize the effects of an action making it less overwhelming for them. Furthermore to this heuristic, we ensured the ability for users to keep track of their report status. This has been demonstrated with different color status icons.”Red-Not Started”, “Orange - In progress” and “Green - Complete”.

Generally, we kept the system's design consistent throughout the processes on both the recipient's and reporter's end. By maintaining a standard view and layout across different pages, the user can easily and quickly get used to the system. All the icons and elements with similar functionalities are grouped together to reduce the effort to find them. Buttons like the login and sign-up are placed in the top right corner, a commonly recognized area for these items. The modals used for the login and sign-up processes are very intuitive and similar to other existing systems. All these factors play a combined role in reducing user effort to use the system and make the user experience much more comfortable and enjoyable.

6.2 **Metaphors employed in our design**

With consideration of each element available in the system to visually communicate with the users, we have allowed users to relate with each icon in relation to its task. The metaphors we used adhere to consistency and standard across applications. The majority of metaphors that have been implemented are relations to their element throughout the application. The intent of these metaphors in our design is to increase how intuitive a system is to a user, and to draw analogies to the real world so it is easy for them to perceive what certain entities in the application are meant for. By using metaphors to draw analogies to the real world and other applications, the user is assisted in completing their required tasks without having to ponder about what a certain user interface element is supposed to do, or being confused by their presence. The system therefore becomes easier to navigate.

The icons that are used in the side bar are direct examples of this intent. They include: a “Recent Activity” clock, a general folder for “All”, an information panel for “Dashboard”, and checked box for “Closed Reports”, a box for “inbox”, a pencil for “Drafts”, a submit icon for “My Submissions” and a plus button for “Create New Report”. The clock for Recent Activity indicates to a user that the page they will be navigating to has reference to time, which in the physical world represents time. A general folder was chosen for the “All'' page to indicate that there is no specificity in the contents of the page. A pencil is used for “My Drafts” to indicate to a user that on this page they will be able to make changes and edit current reports that have yet to be submitted. A pencil, in other realms that are non-digital, is used in practice to indicate the presence of writing. In the bottom left hand corner, the gear icon is used to represent the settings page. A plus button is used to represent addition which results in the creation of a new element - which is exactly what the user is intended to do when they create a new report. Lastly for the side panel, we will address the settings gear. Digital UX iconography uses the gear icon to represent the settings page which deals with system modifications, which has traditional roots related to altering the inner workings of a system[[1]](#footnote-0).

1. [Why is the settings icon either associated with gears or a wrench + screwdriver - User Experience Stack Exchange](https://ux.stackexchange.com/questions/60152/why-is-the-settings-icon-either-associated-with-gears-or-a-wrench-screwdriver) [↑](#footnote-ref-0)