COS 397: Computer Science Capstone I

User Interface Design Document

(Adapted from Susan Mitchell and Karuna Joshi)

BirdSpotter
User Interface Design Document

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1. Introduction

BirdSpotter is a graphical interface for integrating and viewing machine learning and field survey data for rapid population estimation of colonial nesting birds. The creation of this interface will allow officials to quickly and effectively draw conclusions based on data provided from human and machine learning observations of bird species, activity, and location.

1.1 Purpose of This Document

This document aims to provide a detailed description of the design used in the user interface as well as a walkthrough of the interface and its modules. Furthermore, details are provided for the data items within the system as well as the formats of non visual data produced by the application.

1.2 References

This document references:

- System Requirement Specification document: https://drive.google.com/file/d/1gdiXsWQ8f2nXvK7SPesUauaKTBtPlzuF/view?usp=sharing
- System Design Document: https://docs.google.com/document/d/1f183yU4CEzHg-fvArPLX7b3H_0B_rnroG33YCjInfZI/edit?usp=sharing

2. User Interface Standards

The User Interface Standards dictate what the various components of the BirdSpotter app will look like on the basic level. Here is where the format of the buttons, screen, and menus will be laid out. Additionally, the color scheme of the app will be outlined here formally, for the sake of clarity and consistency both internally and externally.

Screen Layout:

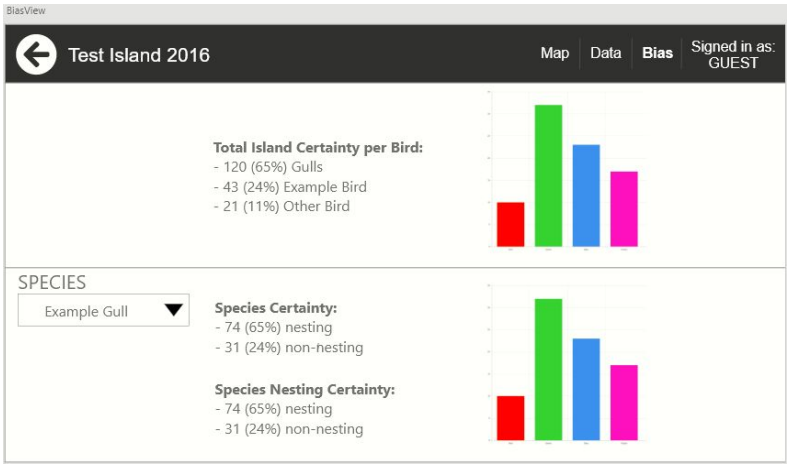


Figure 1: Bias View Template

Each view will be broken up into 2 sections: the view switching section, which is the buttons at the top of the page, and which will link to map_view, data_view, bias_view, and one to log out for every user. There will also be a button to log out of an account for registered users and above (those who are logged in), and when not in main_view, there will be a back button that links back to main_view, as well as showing which dataset is currently being viewed. This is the button displayed in the top left of the template. When the button is not available to a given user, the link will be disabled, and visually differentiated from the others by making the text brighter.

The second section: the graphics section, will be the majority of the screen, and is where the relevant information to each view will be displayed. In map_view, this will be the map and the data points on the map. On the data view, it would be the charts displaying the statistics for that particular dataset. This will be located below the view switching section.

These sections can be seen in Figure 1: Bias View Template. It is the view that will be shown when looking at the certainty and potential bias of the current dataset.

Color Scheme:

Currently, the color scheme for the app is mostly a fairly neutral off-white color for the background of the app, and a dark grey for the buttons and navigation. The background color and button colors will remain consistent among the sections of the various views. All text displayed on the background will be black, and all text displayed on the buttons will be white.

The only exception to the coloring scheme of the buttons is that the logout button will have red text to help steer the user away from accidentally logging out.

Navigation:

Navigation was mentioned briefly in the screen layout section, but it will be done by clicking on the relevant button, such as the “Data” button, which will bring the user to the Data View. Clicking on the back arrow will lead to the MainView, where another dataset may be selected, or a registered user could choose to export the data.

3. User Interface Walkthrough

This section will go over the layout of the User interface of the app and direct the reader as to how the app is laid out and what each view does. Effectively, this section is just combining all of the formalized components from section 2 into more relevant and easily digestible sections that outline the User Interface and relations for the BirdSpotter app. The relations and flow are covered in Figure 2 and its description, and the views themselves will be discussed further down the section with the relevant mockups.

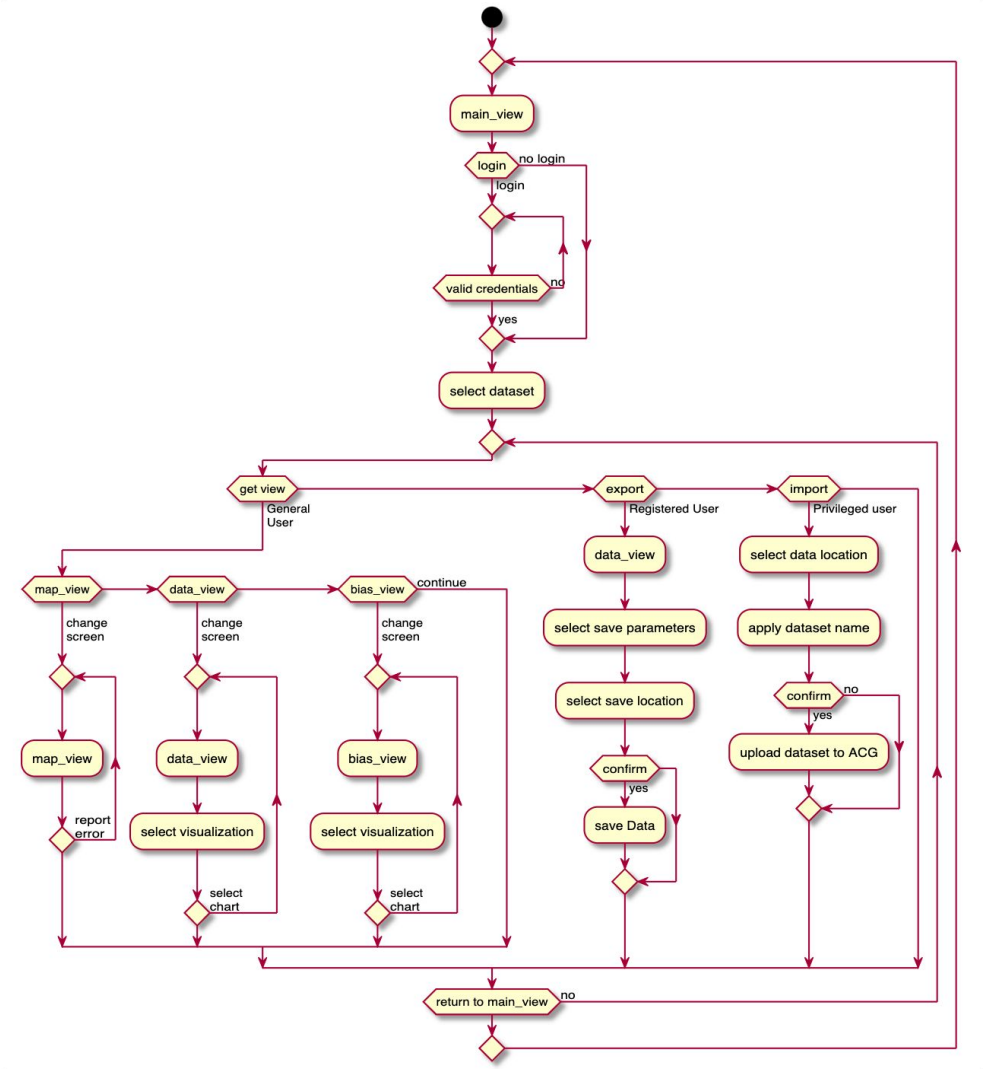


Figure 2: Navigation Diagram

The navigation diagram (shown above) shows the sequence of navigation that a user can take when using the BirdSpotter app. All rounded bubbles ending with "_view" are representative of one of the screens that will be available to users, these views are main_view, map_view, data_view, and bias_view. Additionally, from the main screen, registered users, upon selecting a dataset, can select export, and privileged users can select import. These will be

buttons that are available to users from within the main view. On the map view, “report error” refers to where a user may want to report mistakes in classification of a datapoint on the map. On the Data View and Bias view, “select visualization” refers to opening a menu to change the visualization, and “select chart” refers to the actual selection of the visualization/chart they would like to see.

It is also worth noting that there will always be an option to sign in/log out on each screen, but it would clutter the chart so it has been omitted for clarity.

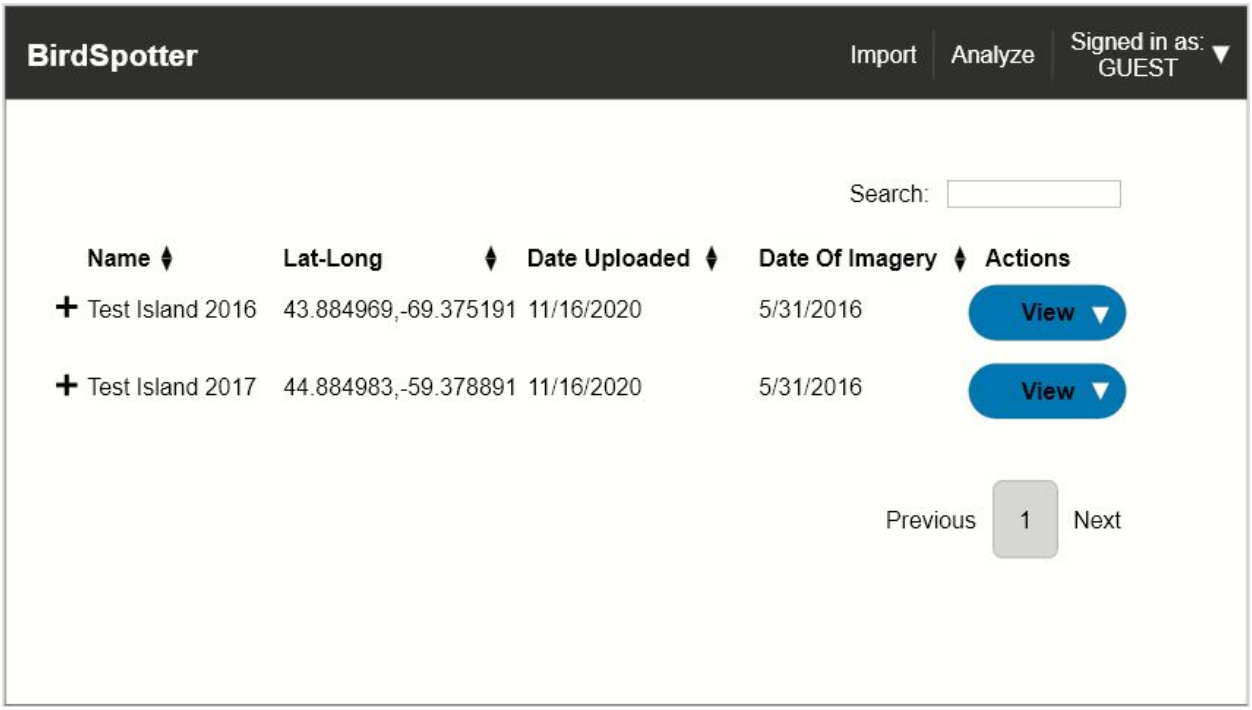


Figure 3: Dataset View/Main View

The main view is the initial landing screen, as well as where a user can select datasets to work with, login to their account, and select which screen they would like to navigate to next. Only Registered Users and Privileged users will have access to the Import and Export tabs that are displayed on this screen to avoid potential issues with public users disturbing habitats based on downloaded geological data and so that only people who are more likely to care about the base data will have easy access to it.

Import, available to Privileged Users and above allows users to upload their own GeoTIFF files to the ACG to analyze.

Analyze allows users to select which analysis algorithm they would like to use on the dataset they are looking at. The algorithms to select from will be the ones provided by the machine learning team. Once a user has selected the algorithm they would like to use, they will be directed to a form to fill in the additional user parameters that the algorithm requires. These the requirements for these parameters will be specified by the designers of the AI algorithm.

The “View” button in the table of datasets is a drop down, and will present the user with an option to select any of the views regarding datasets: Map View, Data View, Bias Vies, and Export View. The Export View is only available to Registered Users and above.

Finally, there is the tab labeled with “Signed in as GUEST”, which is the login/logout tab. This is available on every screen, so it will not be mentioned on further screen diagrams. This is where users will login/logout, and will also allow a user to change their passwords and other settings if they are a Registered User or above.

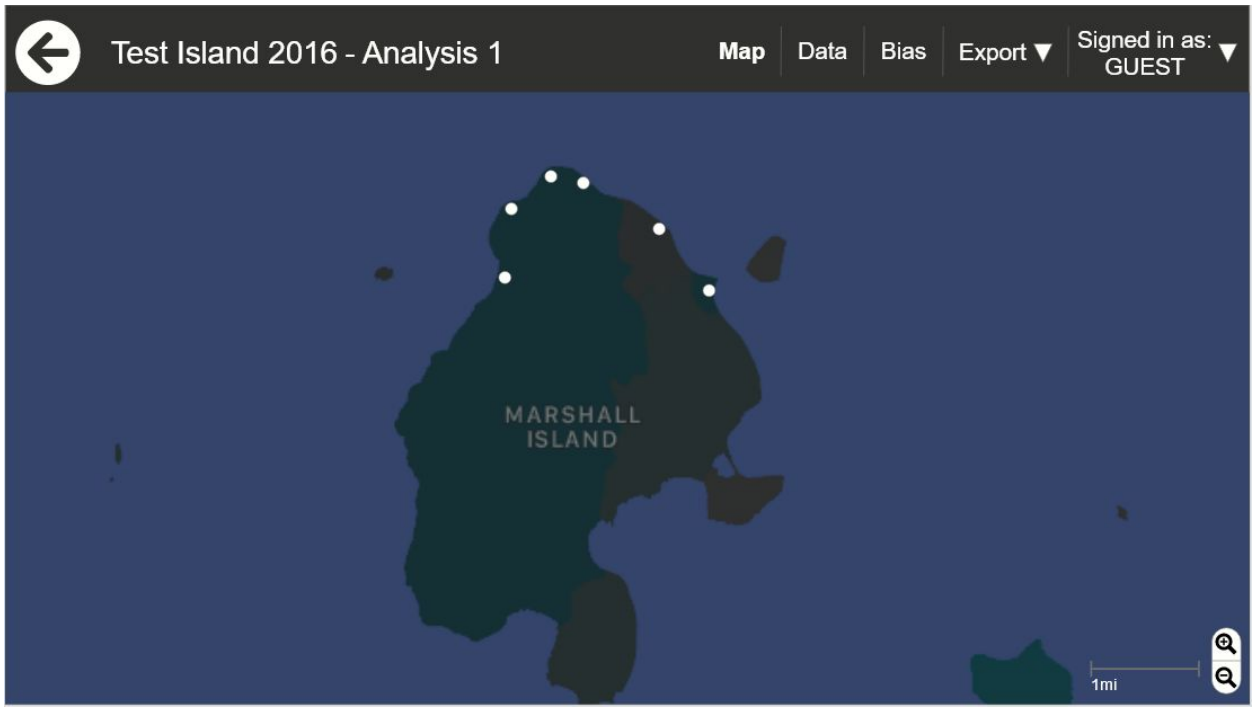


Figure 4: Map View

The map view is where the user will be able to view points in the dataset they have selected in the context of a map. This is also the default tab that is opened when a user selects “View” from the Main View. Users will be able to zoom in and out of the map, allowing for either a more granular view of the data points, or a more *birds*-eye view with a more generalized view of data points. However, if the user is not registered, their ability to zoom in will be restricted so they will only be able to view the more generalized data and not exact data points. Not displayed here is the mouseover information that users will get when hovering over data points, which will display the data and metadata of the selected point. This data will include species, nesting type, the observer, the certainty for that datapoint, and if the user is a Registered User or above, it will also give precise latitude and longitude for the datapoint.

The scale is provided in the bottom right, measured in miles. The + and - magnifying glasses will zoom in and out of the map, respectively when the user clicks on them. Finally, in the top left, the island name or CIREG will be displayed as well as the observer for the analysis, which is listed to the right of the island name. The island name and observer will be visible in this location for every view.

Finally, the export option just to the left of the login/logout button will allow a user to export the current dataset in all of the forms that are available to download. It will be a dropdown

of various download options, and a Registered User will be able to download the relevant spreadsheets, shapefiles, and GeoTIFFs upon the request on this page, and can select the location that they would like to save the file to as well.

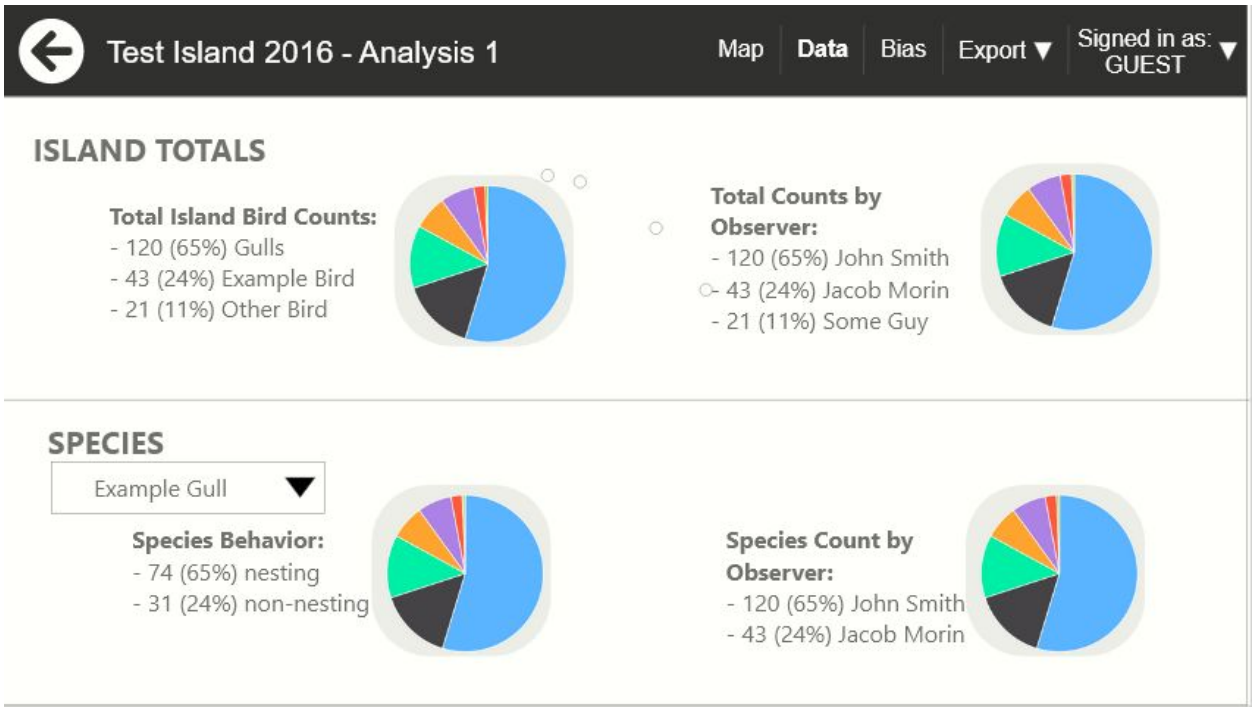


Figure 4: Data View

The data view is where the general statistics of the selected dataset will be displayed in a more traditional visualization method, which the user will be able to select from the available charts. A user may change which data they would like displayed under what is currently displayed as the “Species” dropdown. The data visualisations displayed in this figure are only placeholders. They will be updated in the future as more user experience data is gathered.

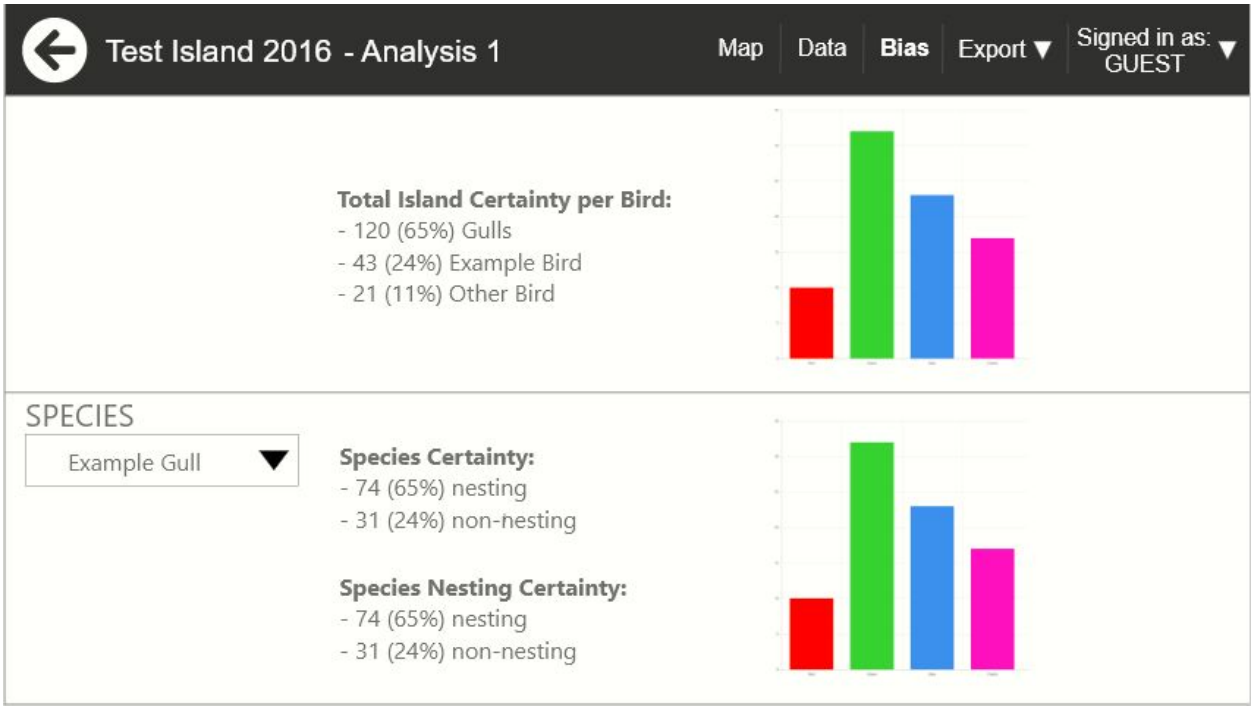


Figure 5: Bias View

The bias view is where the data related to the certainty of observations will be displayed, similar to the data view. In the same way as in the Data View, a user can select how they would like to change the visualization under the "Species" dropdown. The data visualisations displayed in this figure are only placeholders. They will be updated in the future as more user experience data is gathered.

4. Data Validation

Data is anything that can be supplied to the system by a user. This includes both files imported into the system, and forms that the system provided for the user to fill out. The system will accept data supplied in the specified formats, as long as those files are within the limits also specified below. Forms are displayed to allow the user to input information, along with allowing for the filtering of data and changing of location.

File Inputs:

Data Item	Data Type	Limit(s)	Format(s)
Analysis: Shapefile	binary	2GB	.zip, .shp
Analysis: Mask images	binary	16GB	.jpg, .png
GeoTIFF	binary	32GB	.tif

Main View inputs:

Screen Name	Data Type	Limit(s)	Format(s)
Login	String	Username: 1-30 characters Password: 8-30 characters	form
Enter Metadata	String	Metadata: 0-500 characters	form
Search	Int, String	Latitude/Longitude: ± 90 / ± 180 Dataset name: 1-20 characters Datum: [NAD27, NAD83, WGS84]	form

5. Report Formats

Reports are data outputs to the user that are not viewed through the applications interface, but are instead viewed using external interfaces. In the case of Birdspotter, all of the file exports are reports. These exports include the raw data stored within the application, and processed aggregates of the data, as well as additional AI metadata.

Name	Description	File Type
Raw data export	Raw data set of aerial photography	GeoTIFF
Raw Analysis results export	Raw analysis output, in the form of a shapefile of all identified birds	Shapefile
AI Analysis	User-readable AI results, including estimated certainty, accuracy, and mask images	csv
Results Analysis	User-readable representation of all aggregate data displayed by the application, and the data points behind that data	csv

Appendix A – Agreement Between Customer and Contractor

By signing on the provided line below, the client acknowledges and agrees that the deliverables described by the above terms in sections 1, 2, 3, 4 and 5 are satisfactory, as well as all other clauses described in this document.

Client signature:

Cynthia S. Loftin date: 11/24/2020

Client comments:

By signing on the provided lines below, all Penobscot Development Group members acknowledge and agree to meet all system design deliverables described in sections 1, 2, 3, 4, and 5, as well as all other clauses described in this document.

Penobscot Development Team signatures:

date: 11/24/2020

Devin Christianson date: 11/24/2020

Kyle Walker date: 11/24/2020

date: 11/24/2020

date:

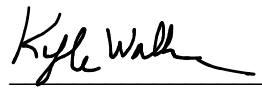
Changes to this document may be required as the development cycle progresses. All new drafts of this document must be reviewed, agreed upon, and signed by both the Penobscot Development Group and the client. Upon the signing of a new draft, the previous draft becomes void and the new draft supersedes any obligations set by the previous draft.

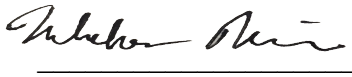
Appendix B – Team Review Sign-off

By signing below, all Penobscot Development Group members acknowledge that they have reviewed all system design deliverables described in sections 1, 2, 3, 4, and 5.

 date: 11/24/2020

Devin Christianson date: 11/24/2020

 date: 11/24/2020

 date: 11/24/2020

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Appendix C – Document Contributions

The below table describes the Penobscot Development Group members contribution to the document for internal purposes.

30% - Jacob Morin - Section 2
15% - Devin Christianson - Section 5
25% - Alexandre Feren - Section 3, Section 2
10% - Kyle Walker - Section 4
15% - Nick Kania - Section 1, multiple section intros