

Evaluation Assignment Two: Heuristic Evaluation

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Submitted on: 19 February 2019

Design Description

The undergraduate students are working with Massachusetts state marine fisheries specialist to create a web-based mobile application that will replace the paper datasheets used by marine biologists and citizen scientists in the collection of eelgrass data during monitoring events. The design covers the following scenarios:

- 1) Users can sample and record the data in a progressive manner as per the instructions prompted on the screen. This can be repeated for multiple samples.
- 2) Scientists and Marine specialists can download the data in the form of CSV to analyze it.

The intent is to create an intuitive and user-friendly app that the users can easily navigate and record their observations while reducing the number of errors. The users are provided with a help text to guide throughout the navigation of application.

Identification of UI domain

The user interface domain of the Eelgrass monitoring app is a web-based mobile application. The primary function of the app is to enable Citizen Scientists and Marine Specialists to record eelgrass sampling data with ease using a simple and intuitive interface. It has multiple screens where the user is prompted to enter various observations like trip, location, Secchi sampling, and drop frame data in a form-based interface. The information recorded by the users will go through some basic sanitization to prevent erroneous data submissions. The UI also offers an interface for scientists to view and download this data in a CSV format for performing the analysis.

Heuristic Usability Principles (Application)

This evaluation uses Nielsen's Usability Principles found here: <https://www.nngroup.com/articles/ten-usability-heuristics/>

These are modified to fit the current context

Visibility of System Status

Users should be informed about their activities, including what they have done, what they are doing and how to do what they will do.

Match between System and the Real World

The system should use the words and concepts that users can easily understand. The terms used in the system should match the expectations and understanding of users.

User Control and Freedom

Users should be in control and have the freedom to navigate the environment; when they make mistakes, they will need help navigating back or undoing their actions.

Consistency and Standards

Users should not be confused if certain words or actions mean/do the same thing.

Error Prevention

Even better than error messages is a careful design which prevents a problem from occurring in the first place. Either eliminate error-prone conditions or check for them and present users with a confirmation option before they commit to the action.

Flexibility and Efficiency of Use

The application should be easy and quick to finish the tasks for both experienced and inexperienced users. It should give enough support to help users complete the tasks.

Aesthetic and Minimalist Design

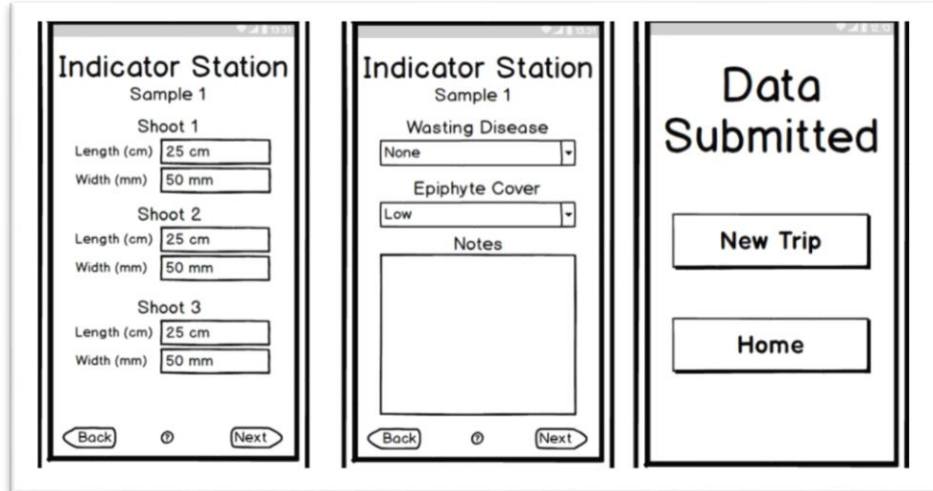
Pages should not contain information which is irrelevant or rarely needed. The design should be simplistic and aesthetics should support the user's functionality and goal.

Help and Documentations

A help or documentation might be necessary to the novice users for understanding the system. If such help documentation cannot be offered, the interfaces should be clear and simple enough so that the users can learn naturally with the flow of the system.

The image displays seven mobile application screens for 'Eelgrass Tracker', arranged in two rows. Each screen is a wireframe showing data entry forms with various input fields, buttons, and navigation options.

- Screen 1: Eelgrass Tracker**
 - Buttons: Enter Data, Download Data
- Screen 2: Trip Data**
 - Form fields: Date of Trip (8 / 26 / 19), Crew Members (Brady Hehe, Jace Haha, Collin Lal, Bob Smith), Boat Name (Speedy Science Boat)
 - Navigation: Back, Next
- Screen 3: Location Data**
 - Form fields: Station Number (AlphaNumero1), Latitude (42.03586), Longitude (-70.69758), GPS Device (Garmin)
 - Navigation: Back, Next
- Screen 4: Weather Data**
 - Form fields: Wind Direction (North), Wind Speed (0 - 5 Knots), Sea State (Glass-Calm), Tide (High)
 - Navigation: Back, Next
- Screen 5: Secchi Samples**
 - Form fields: Water Depth (5 Feet), Time (13:50), Secchi Depth (13 Meters)
 - Navigation: Back, Next
- Screen 6: Drop-Frame**
 - Form fields: Picture Taken (Yes), Picture Timestamp (13:52:03), Sediment (checkboxes for mud, gravel, clay, cobble, sand), Percent Cover (1 - 10)
 - Navigation: Back, Next
- Screen 7: Drop-Frame**
 - Form field: Sample 1 Notes (Notes)
 - Navigation: Back, Next



Current Prototype of the App**

Usability Problems

1. Lack of Progress and navigation bar:
The application lacks a progress bar which violates the **Visibility of System Status** principle. It is essential for users to keep track of what they are doing, what they have done and what should be their next step. To alleviate this issue, a progress bar can be added at the bottom of the screen or a hierarchical menu can be added highlighting their current progress. It can also serve a double purpose of navigating through multiple screens at once.
2. Lack of Connection Status indicator
Since the application is being used in both offline and online environments. It is essential for the user to get feedback on whether their data is being uploaded or is it being stored locally. They also need to know how many records have been created and stored locally so far and should be able to track its status until the data is uploaded. This can be classified under the violation of **Visibility of System Status** principle.
3. Editing and deleting the records after submission
It is highly possible for an individual to make mistakes when performing a data entry task. In the current app design, there is no provision to make corrections or deleting the unwanted records after submission. This violates the **User Control and Freedom** principle. It is recommended to create an interface to view, edit and delete the records for a user.
4. Review and Confirmation screen
It is important for a user to review all the details entered for standards and accuracy before they are able to submit it. In the current design, there is no review/confirmation screen which violates the **Error Prevention** principle. A view can be added to review all the entered data and seek user's confirmation before submitting it.

5. Missing Submit button

A user should not be confused if certain actions mean/do the same thing. In the current prototype, the "next" button in the indicator station view is used to submit the entire record. A user might not be aware that this is the final view and the next button would submit their record. This is a violation of **Consistency and Standards** principle. In the end, a user must be provided with a submit button and confirmation to prevent ambiguity.

6. Choosing the right controls and their range

It is important for the user to understand the data controls on the screen to ensure accurate entry of data. In the Secchi, samples view it is unclear if the water and Secchi depth would be entered using a combo box/dropdown/textbox. This is a violation of **Error Prevention** principle. If a dropdown is used then what would be its range? It is usually not easy for a user to scroll through a large range on a small display especially if they are recording the data on a boat. However, if a textbox is being used it is important to validate its units and range to maintain data consistency.

7. Lack of Home button

The application lacks a home button on every screen which is a violation of the **User Control and Freedom** principle. There might be scenarios where a user might want to return to the home screen before submitting the form. In the current prototype, a user is required to navigate through multiple screens either in the forward/backward direction to reach the home page. To alleviate this issue a home button can be provided and upon tapping it a confirmation dialog can be displayed stating that the progress would be lost and the user would be returned to the home screen.

8. Help/Documentation

The current prototype does not provide with a help/documentation view to understand the entire data entry process and troubleshooting it. This is a violation of the **Help and Documentations** principle. The support can be implemented at two levels, in every page, and for the overall app. A help button in every page can be used to explain the data controls and type/unit of data being expected from the user whereas the documentation for the entire app can be displayed in home screen to explain/troubleshoot the data entry process on the whole.

Identification of Critical Usability Concerns

Critical usability concerns are problems that would prevent the user from performing essential operations. From the above usability issues, I consider the following as critical issues:

- Lack of Progress and navigation bar (*Visibility of System Status*)
- Lack of Connection Status indicator (*Visibility of System Status*)
- Review and Confirmation screen (*Error Prevention*)
- Choosing the right controls and their range (*Error Prevention*)

Critical Usability Concerns (Scenarios)

- Scenario 1: Lack of Progress and navigation bar

Jean Gray is a graduate student in Environmental and Ocean Sciences who is volunteering to study eelgrass samples as a part of her course. She downloads and installs the eelgrass monitoring app. Along with others she gets on the boat and reaches the sampling point. She chooses to “Enter Data” and starts recording the information. After entering the drop frame data for sample 1, the app prompts her to enter the data for sample 2. Jean has no prior knowledge of the number of samples to collect and goes with the flow of the app. She enters the details for the second sample and then the app prompts her to enter the details for the third sample. Jean is now confused if she is making the right progress as she does not know the number of samples she must enter before proceeding to the next view. She stops entering the data and seeks the help of her leader.

- Scenario 2: Choosing the right controls and their range

Jean resumes her work and starts entering the Secchi sampling details. She remembers that in her previous assignment her leader had asked her to enter the depth in meters, therefore, she enters the details in meters and moves on to the next page. Meanwhile, some of the crew members enter the details in feet considering it as a standard. The analysts who receive the data realize that there is significant inconsistency in the data and units of Secchi samples collected by volunteers making it difficult for them to study.

- Scenario 3: Review and Confirmation screen

Jean continues to enter the details according to the flow of the application. Finally, she completes entering the indicator station details and realizes that it is appropriate to enter the Secchi depth in feet. However, she plans to make all the corrections in the end and taps the next button. To her surprise, she gets a notification that her data has been submitted. She is now worried that she cannot correct the Secchi sampling details anymore and reports her situation to the leader.

- Scenario 4: Lack of Connection Status indicator

Jean completes her work and submits the recorded data. However, she realizes that there was no signal on the boat and is unsure if the data was sent successfully to the scientists after reaching the mainland. Jean reaches out to the DMF office to verify if they have received the data or not.

***The current design does not describe the views from the scientist's perspective which creates uncertainty on the usability issues that they might face. It is suggested to work with the scientist to come up with a design and prototype accordingly.*