



# Case Study

## Background

In 2022, I started working at the Cognitive Behavioral Lab at NC State University, and one of my projects has involved working with Vanessa Woods on her Biophilia Reactivity Hypothesis, which seeks to reframe the speculative concept of Biophilia from *Biophilia* by E.O. Wilson into a falsifiable hypothesis that Biophilia is caused by a domain specific attraction to biodiversity in the brain. Work we have done in developing this area of study has included surveying with Likert Scales, conducting a stress study based on saliva samples, and studying participant behavior in controlled, plant bed environments like Metrolina Greenhouses.

As guidelines for well-informed user-centered design, I will be using a modified mix of the Double Diamond design process and IBM's Enterprise Design Thinking process that I learned in real-time while working with IBM at NC State on a solution for the City of Zebulon's Fire Department.

## Stakeholders

The stakeholders for this project are myself (Grant Eubanks), NC State University, the Cognitive Behavioral Lab at NC State, Duke University, the department of Interdisciplinary Studies at NC State, and Raleigh Citizen Scientists.

# Problem Statement

As research continued, it became clear that the artifice of the lab and plant bed environments may be influencing individuals' natural preferences of biodiversity and nature, and that more data was needed about the real life experience of the participants when they go into natural spaces.

This idea eventually lead Vanessa to ask me to make an app that sends short surveys to participants around our local area of Raleigh, NC whenever they are in a green space, so that the Cognitive Behavioral Lab can then use this data alongside publicly available data regarding biodiversity and other variables to make more informed conclusions about the nature of Biophilia as a phenomenon.

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## Discovery

### Similar Apps

To better understand possible implementations of a solution like this, I researched into other apps that had a model close to ours. Both these apps and ours fall under the umbrella of "Ecological Momentary Assessments" using the "Experience Sampling Method". While there were not many apps that fell within the criteria of a location-based survey app, I chose two apps to talk about that had useful information: Mappiness and iExperience.

### Mappiness

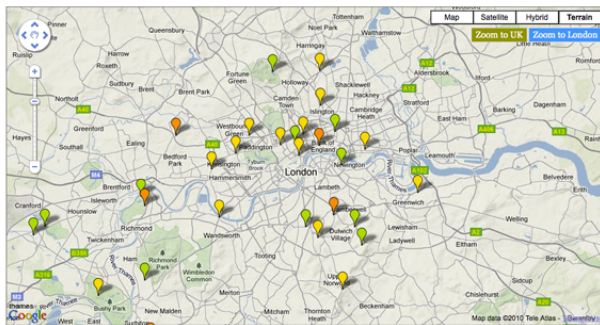
Mappiness, the most well known app of the three, is a project from 2010 by the London School of Economics and Political Science that periodically pings users to ask about their mood. On their website, they say that they "want to better understand how people's feelings are affected by features of their current environment"— and they do that by comparing this mood data with other factors like "air pollution, noise, and green spaces".

The app collects this data through notifications that bring users to the Feelings screen, where they change slider between spectrums of happiness, relaxation, and wakefulness.



Feelings Screen

This data is then used in many different displays for users to enjoy, including mood maps and location-specific readings of happiness called “Hedometers”.



**where are we happy?**

These are the outdoor places where mappiness users have most recently reported feeling happy.

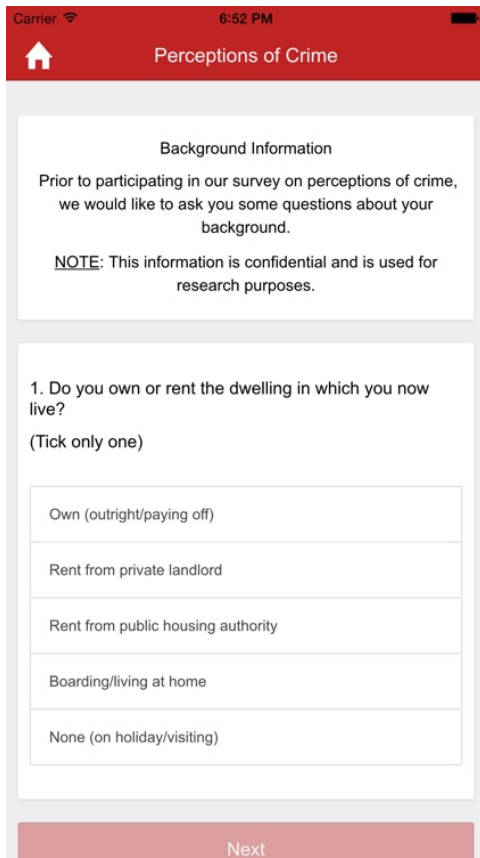
Map



Hedometer

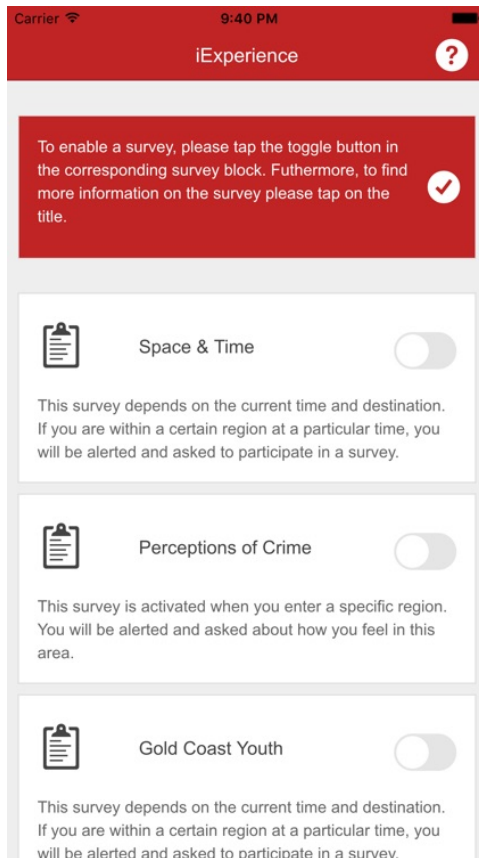
## **iExperience**

iExperience is another survey delivery platform developed in 2015 by the School of Criminology and Criminal Justice at Griffith University. It was developed to measure data about the fear of crime in a region and correlated that data with background information about participants' perception of crime collected from an onboarding process. It is no longer available, but existing information online explains how the app functioned.



Users are presented with the surveys in a very similar way, but are given multiple options to enable that use different methods and parameters that decide when to serve the user with a survey. These options include location and time data and more specific surveys for a location triggered by a geo-fence.

This app seems to be simpler and more in-line with the scope of this project. The feature of enabling and customizing types of surveys using toggle sliders is interesting and may prove to be useful.



## Hopes and Fears

A standard UX practice is to generate a list of positive and negative outlooks about a project before starting ideation.

### Hopes

My hopes for this app are that it is an enjoyable, pleasant experience that provides another, more accurate angle on what people think about different natural environments and biodiversity. I hope that the app will have valid, significant data that can be replicated and makes an impact on the scientific community.


### Fears

My fears for this app is that it distracts or takes away from the experience of being in nature, skews or invalidates the data in any way through its design decisions or the semantics of its copy.

Another fear that I have is that the app will get limited use due to not providing enough for the users, but the lab's past studies alongside the notable presence of citizen scientists in the Triangle area gives me confidence that there will be a small user-base at the very least.

## Personas

"Sure, I can do the surveys before my walks. I can't promise much else, though!"



**Patty**  
App User  
Enjoys nature more than science

**Situation and context**  
What is the typical context of the real people represented by this archetype?

Regular person	Not a lot of free time?	Regularly opens to green spaces	Wide range of different types of people	Wide range of emotions during time in green spaces
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**Goals and motivations**  
Beyond our product and service, what motivates this person?

Enjoys nature	Is helping to be nice or because it's interesting	Wants to be a part of the study	Likely curious about Biophilia	Wants to enjoy the experience of taking surveys
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**Fears and frustrations**  
What keeps them up at night? What does a bad day look like?

General life stress	Lack of connection with nature as often as they would like	Annoying notifications could frustrate	Concerned about security and data	Likely has other things than nature on their mind when in nature
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**Tasks and tactics**  
What does the person do to accomplish their goals?

Does surveys very quickly - no need to spend extra time	Goals into nature to relax and connect	Likely spends time outdoors with others too	Willing to take a survey to help	Enjoy expressing their emotions
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"I'll do whatever I can to help!"



**Cliff**  
App User  
Enjoys science more than nature

**Situation and context**  
What is the typical context of the real people represented by this archetype?

Scientist or scientifically minded	Often has more free time, but could have less if still practicing	Could be retired	Could do this alone, or could do this with others	Will keep up with the research
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**Goals and motivations**  
Beyond our product and service, what motivates this person?

Also enjoys nature	Enjoys science a lot	Gets a lot out of helping and connecting with others	Getting outside in the field	Sharing about their contributions to others
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**Fears and frustrations**  
What keeps them up at night? What does a bad day look like?

More concerned about data and study design	Life stress	Could have a more stressful job	Contributing to a study that they do not agree with is time	If other health issues could make it harder to be outside
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**Tasks and tactics**  
What does the person do to accomplish their goals?

Often contributes to citizen science projects	Has likely done research in the past	Spends time outdoors	Part of scientific community	Keeps in touch with researchers
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"Let's discover the nature of Biophilia!" Now how do I get my data?"



**Vanessa**  
Researcher  
Enjoys good, accessible data

**Situation and context**  
What is the typical context of the real people represented by this archetype?

Working on PhD	Working in a lab as well	Other family priorities, projects	Working on Biophilia Reactivity Hypothesis	Surrounded by interested researchers
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**Goals and motivations**  
Beyond our product and service, what motivates this person?

Curious about nature	Wants to finish academic career	Curious about humanity	Learned about the concept of Biophilia	Wants to formulate philosophical ideas
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**Fears and frustrations**  
What keeps them up at night? What does a bad day look like?

Wants that study to be viewed with validity	Wants to finish PhD smoothly	Juggling lots of things right now	Keeping updates in time	Bad data would be not good
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**Tasks and tactics**  
What does the person do to accomplish their goals?

Works with lab to design studies	Collects data through laboratory studies	Analyzes eye tracking data	Writes and consults with others	Commissioned this design
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Another common UX practice is to create brief profiles of the stakeholders for a project and describe what they think, feel, say, and do. This allows for a more personal look at the users of a project. I narrowed the list of users down to the researchers and the app's users that are either citizen scientists or just regular nature enjoyers.

## Researcher (Vanessa)



Vanessa is based off of Vanessa Woods, the lead researcher on this project who has initially started doing this work for her PHD thesis, but plans to expand on it further over time. As a stakeholder in this app, she has communicated a need for field data and thinks it could be useful in determining and proving the nature of Biophilia. She feels excited about the project and anticipates processing this data in order to write more publications, and shares similar hopes and fears to me.

She needs to be able to access the data in a format that is easy to work with and easily interfaces with the database that the users interact with.

### **Citizen Scientist (Cliff)**



Cliff is the typical user that interacts with this app. He considers himself a citizen scientist— an individual that contributes to and conducts science outside of traditional academia or a laboratory environment— and enjoys regularly



contributing to whatever he can in this community. He gets excited when we ping him to answer surveys and may look for extra information to submit. He's curious about the research outcomes and would like to be notified when his contributions are published. Our ideal user!

Cliff interfaces with our system through the mobile app, which needs to be able to interact with the program hosted on our cloud service

## **Nature Enjoyer (Patty)**



Patty is another type of user to be considered that is very similar to Cliff, but essentially represents every user that is not Cliff that we would like to consider in this process: a nature-goer that is not a citizen scientist. Patty thinks that the research is interesting and wants to contribute, but will not hesitate to delete the app if it gets too demanding or distracting. She regularly uses and enjoys the green spaces around the Triangle and would not like that experience to be disrupted. They will likely feel annoyed at least once at a notification from the app and has less desire than someone like Cliff to contribute to public knowledge.

Patty uses the mobile app in the same way that Cliff does, minus some extra survey questions that are intended only for users that want to give extra information.

## **Needs Statements**

**Researchers need to be able to accurately measure how people feel in different natural environments so that they can better help**

**the scientific community understand the nature of Biophilia.**

**Regular users need an unobtrusive and brief survey method so that they can provide accurate data while being undisturbed in nature.**

**Citizen scientists need a way to apply their extra excitement and knowledge so that they can help the scientific community in the way that they want to.**

## **User Journeys**

After defining personas, it is important to chronicle their movement through the systems we are designing.

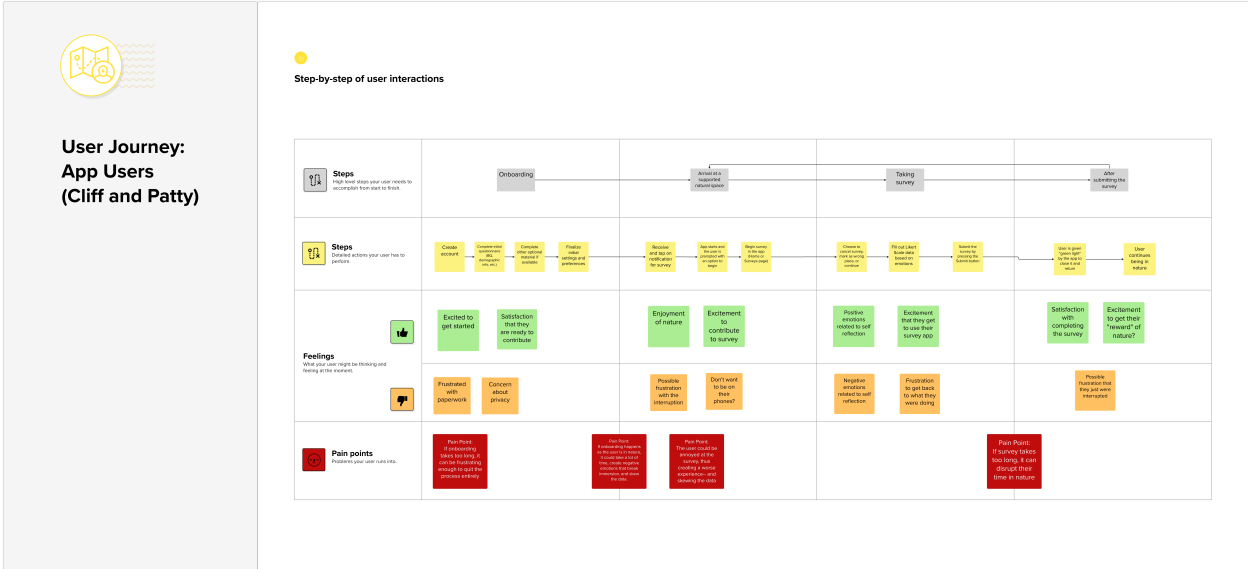
### **App Users (Cliff and Patty)**

Cliff and Patty are the primary users of this app, and are the primary journey to be focused on. After they download the app, they will have to go through an onboarding process where they create an account with a username, email, and password and likely answer a few other questions.

Then, they must fill out an initial questionnaire that includes demographic questions and whatever initial information is required per Vanessa's study. This will likely include the Biophilia Quotient, a key measure of Biophilia that Vanessa has been developing. Once this is completed, there will likely be some additional, optional material that more invested users like Cliff can complete. This strikes a good balance between the amount of data collected and the amount of time it takes to onboard each user.

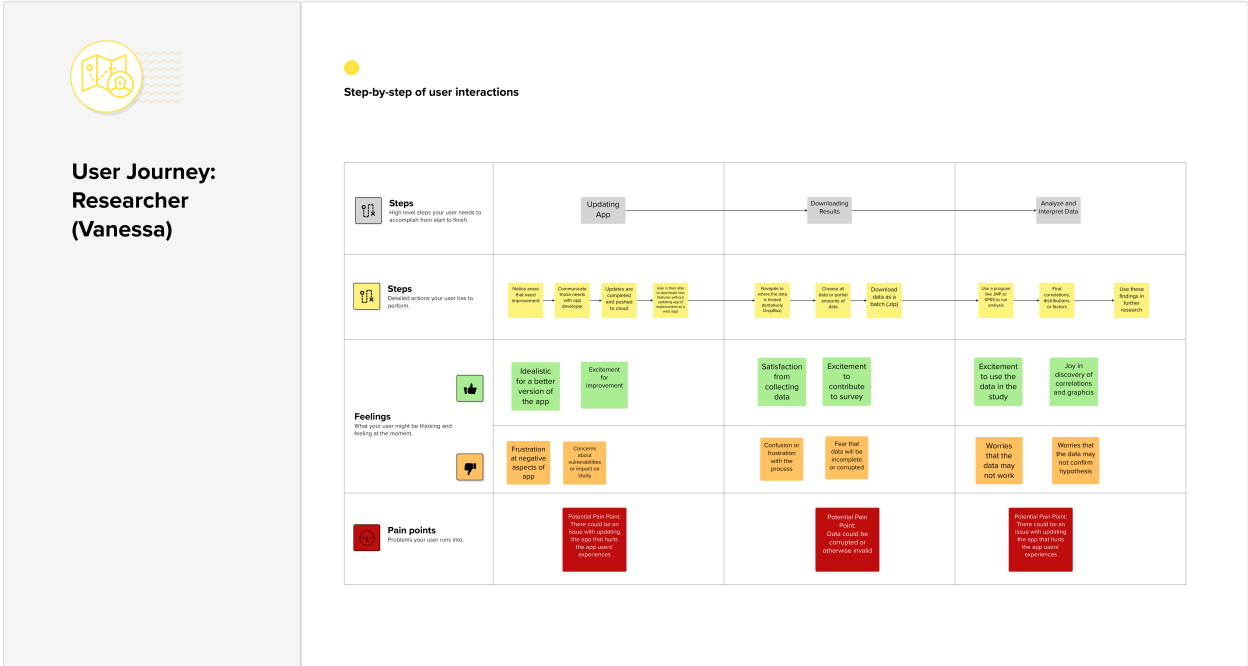
#### **After onboarding, the typical usage loop looks like this:**

The user travels to a supported natural space— likely one in the Raleigh area— and is notified that a survey is available for this location. They click on the notification and enter the app, where they are met with a short survey. They take anywhere between 15 seconds and a couple of minutes filling out this survey, submit it, are thanked for doing so, and close the app. Then they finish their time in nature as normal until the next time they enter a green space.



## Researcher (Vanessa)

Vanessa's journey is different from the users that interface with the system through the app, starting with the release of the app. Then, a cycle follows: update the app as needed, download the results (either full results or partial results), analyze and interpret the data, and then notice any areas of improvement or invalid results within the app.

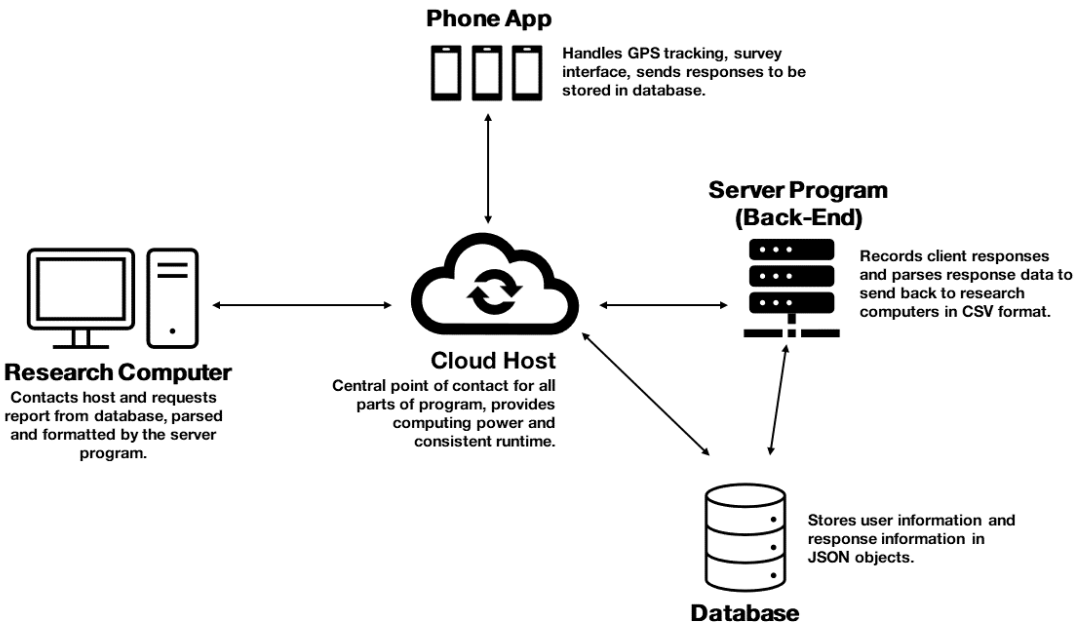


# Ideation

## Information Architecture

Before designing any specific interface features, it is important to know what information is coming into the app and which information is leaving the app. Here is a chart that maps this flow and what other parts of the system to keep in mind when ideating.

## Flow of Information



## Pagination

My first step before making a mockup was to divide the interface into discrete pages based off of their functions. My priorities were to keep the flow of surveying simple and immediate while not leaving out any essential functions.

I decided on five pages, with the first three being available in a bar at the bottom of the screen:

## Home

The Home page serves as the landing page when the app is opened and it is intended to prompt the user with the most relevant information needed.

This will be achieved through the page's format of vertically scrollable cards, each with action buttons to resolve or remove the cards from the screen. New cards will be added to the top like a queue, but will be removable from anywhere. This keeps the information relevant and accessible while reducing clutter.

## **Survey**

The Survey page lists all current and past surveys, so that users can get a sense of the amount of work that they've done for the lab. Surveys are available in card format, and when pressed, enter a survey— which themselves are a class of page as well. These surveys will use various interaction methods like sliders and buttons to answer questions for each location available, but how do user know which places are available for surveys?

## **Map**

The Map page provides users with essential information about the regions that are supported by the app. It is composed of a single map with supported regions highlighted in light green, with visited regions highlighted in a darker green. When these regions are pressed, they provide the name of the park, the number of times the user has submitted surveys for the region, and possibly could offer a navigation option.

## **Settings**

The settings page is available from every other page through a gear icon in the top right of the screen. It allows users to change preferences and configurations regarding their surveys and methods of collection.

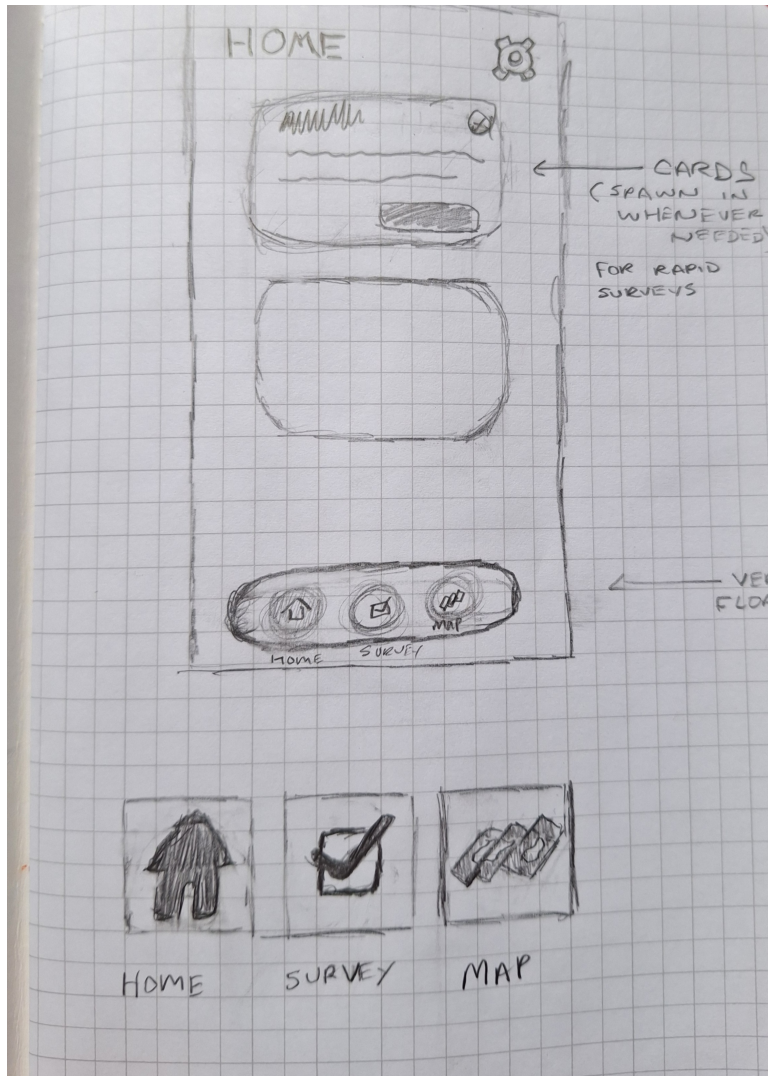
## **Profile**

This page allows the user to change what the app will receive regarding their profile and personal information. It could also show any relevant notices or metrics regarding the profile's usage of the app.

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# Prototyping

## Sketch



## Figma Mock-Up

I took my sketches and made a first draft for the Figma Mock-Up. It looks a lot like the final version, but had less contrast in the color scheme and gave the user the option to "snooze" surveys for later.

## User Feedback

## User Feedback for First Draft

To summarize the feedback I received from stakeholders regarding the first Figma Prototype, I had included too many accommodations for the end-user that complicated the app and made the data less ecologically valid.

The option to delay studies that I included to allow survey-takers to enjoy their environment and still take the survey immediately afterwards turned out to not be a viable option. I also included too many unnecessary responses on the in-survey page that created clutter and prevented the users from getting directly into the survey.

## Final Design

### Revision

The final interface changes brought simplicity, readability, and better validity to the app. I made the background a darker shade of green and balanced brown highlights to match. I also simplified the survey user flow and removed the option to snooze surveys.

### Figma Link

[https://www.figma.com/proto/iiYHwCZNbrYFr4ZG0agCm7/Biophilia-App-Prototype-1?type=d\[...\]&page-id=0%3A1&starting-point-node-id=1%3A3&mode=design](https://www.figma.com/proto/iiYHwCZNbrYFr4ZG0agCm7/Biophilia-App-Prototype-1?type=d[...]&page-id=0%3A1&starting-point-node-id=1%3A3&mode=design) FigmaFigma

## Next Steps

Future work on this project, if enabled, includes fully mapping out the onboarding and settings menus, finding a full-stack developer or team, determining the software stack of front-end and back-end frameworks, developing the web app, setting up the hosting infrastructure, launching the app, and maintaining the app.

I will stay in contact with the Cognitive Behavioral Lab to provide any assistance needed, and they will have access to this case study as well.