

Proxibio: Biodiversity Knowledge in Your Neighborhood

SI582 Interaction Design Project Report

This paper presents Proxibio, a mobile application that provides information of nearby species and encourage learning and knowledge discovery in local biodiversity. The concept was developed and transformed into final design through a user-centered process, utilizing approaches including sketching, storyboarding, prototyping. The final design aims to offer biodiversity knowledge in an easy and time-efficient manner, and thus to prolong users' curiosity into a sustained learning experience.

1. Problem and Context Statement

Any neighborhood is populated by more than just human beings. People constantly get curious about animals and plants living around them, longing to know their names, living habits, and differences from other species; yet seldom do they have the proper resource to refer to, nor do they want to spend time and effort on such information inquiries. Thus this curiosity oftentimes fades away, and never get the chance to realize its value.

Though there are existing information resources that might be useful in such circumstances, they are mostly either too time-consuming (e.g. Google search or Wikipedia) or too professional for general user groups (e.g. online biodiversity databases, birdwatching applications, etc). Moreover, in most cases, what arouse people's interest are only a small glimpse of the natural wonder; while the rich relations and interactions among species and local environment remain unseen. A simple keyword search in Google or Wikipedia is oftentimes incapable of revealing such complexity, and thus are not ideal tools for biodiversity knowledge discovery.

As shown in the brief analysis above, bridging the gap between curiosity and learning in biodiversity knowledge requires a system that is time-efficient, encouraging, and provides understandable information to general users. This understanding of the current problem served as the starting point of the design process of Proxibio.

2. System Overview

The solution I propose is a small, locally based knowledge system that facilitates production, communication, and acquisition of biodiversity knowledge among general user groups in the neighborhood. The system is designed on the mobile platform in order to support everyday use and quick, easy access to information.

The focused user group is the general public in a local setting (a city or a town), who are interested in biodiversity but don't necessarily have professional knowledge level. To better address this user group and local context, the design of Proxibio included following considerations:

a. Locally and timely specific knowledge. The presentation of biodiversity knowledge in Proxibio is situated in specific geographic location and certain seasons, which is further integrated into users' own discovery experiences. The incorporation of location and time elements enable knowledge to be better situated into the local context, and also to provide a more holistic experience of knowledge discovery.

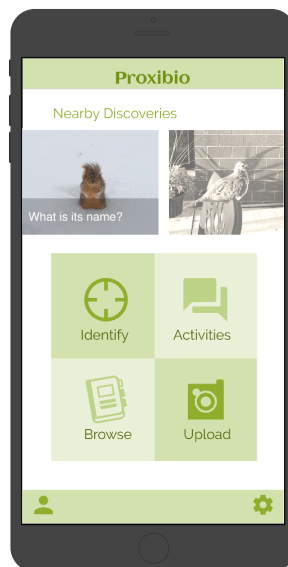
b. Linkage between knowledge items. Natural species are never isolated; they're connected to each other, as well as to various elements of the local environment. It is this complexity of relations and contextual network that make biodiversity knowledge alive. Inspired by ecological network and librarian concepts of semantic web, ontology and linked data, Proxibio attempts to create linkages between species, environmental elements, and other related items, creating more possibilities for users to explore further knowledge than their immediate demand.

c. Prompts and incentives. Considering the general knowledge level and possible individual differences, Proxibio is designed with probe mechanism to guide users in learning. Incentives are also included to encourage user interaction with the system.

d. Social communication. Proxibio is designed with a moderate level of social network function to facilitate knowledge discovery and sharing. This communication function is limited in the local context and only to biodiversity purposes to ensure the overall consistency and effectiveness of Proxibio as a knowledge system.

3. Design Description

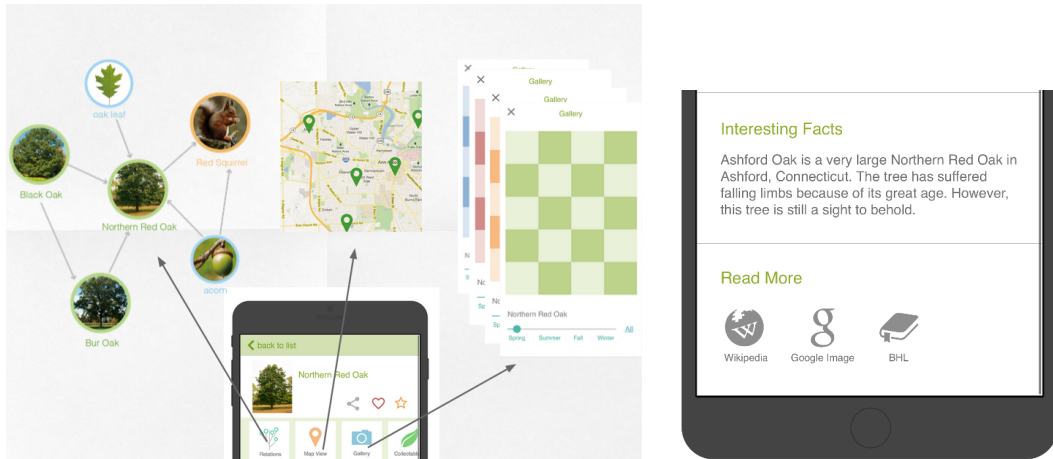
“Proxibio” has following functionalities that support serve its purpose:



Proxibio homepage

a. Identification of species. Based on user's preset profile and current location, as well as user's answers to a series of prompt questions considering characteristics about the species, Proxibio provides a refined list of possible species.

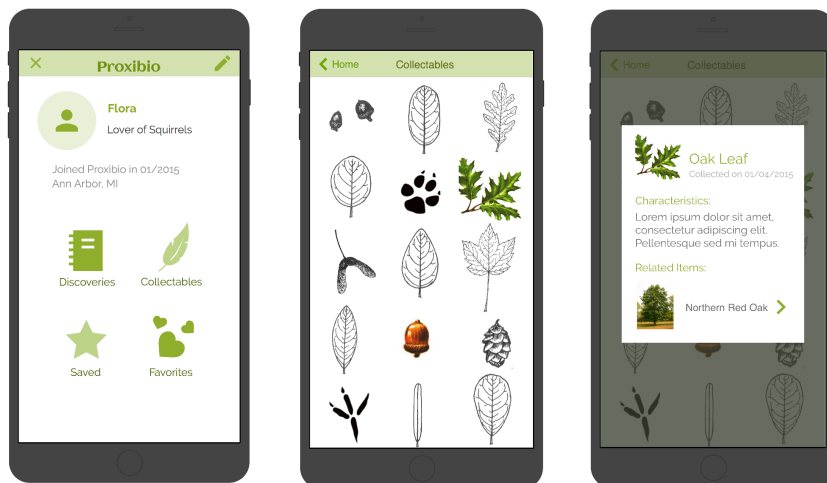
b. Local species catalog. Each species has an essential information page, a relation map page, a location page, and a gallery page. These integrated pages allow users to gain information in a situated context both in terms of geographical location and time, and provide different pathways for further knowledge exploration.



Different views and outside links on the information page of a certain species

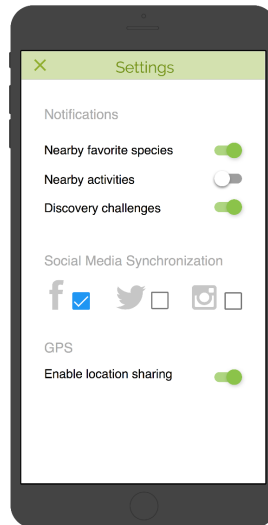
c. Upload and share discoveries. Except from using the identification function, users can also upload photos of their discovery and/or ask people in their neighborhood about these species. Preset questions are also designed to make the upload process more time-efficient.

d. Personal space and collection. Users are able to review their previous discoveries in a timeline, map, or calendar view. Users can also collect species-related items while discovering new species. These collectables work both as an incentive and a pathway to related knowledge exploration. Users can also save certain species for later reference, or favorite the ones they feel like to know more.



Personal space and collectables. Each collectable item leads to information page of the related species.

e. Notifications. Proxibio is designed with gentle prompts to encourage users' learning and discovery behavior. Users can choose to receive notifications when approaching favorited species, when nearby users posted a question, or daily recommendations of discovery challenges.



Proxibio notification settings

Design Flow

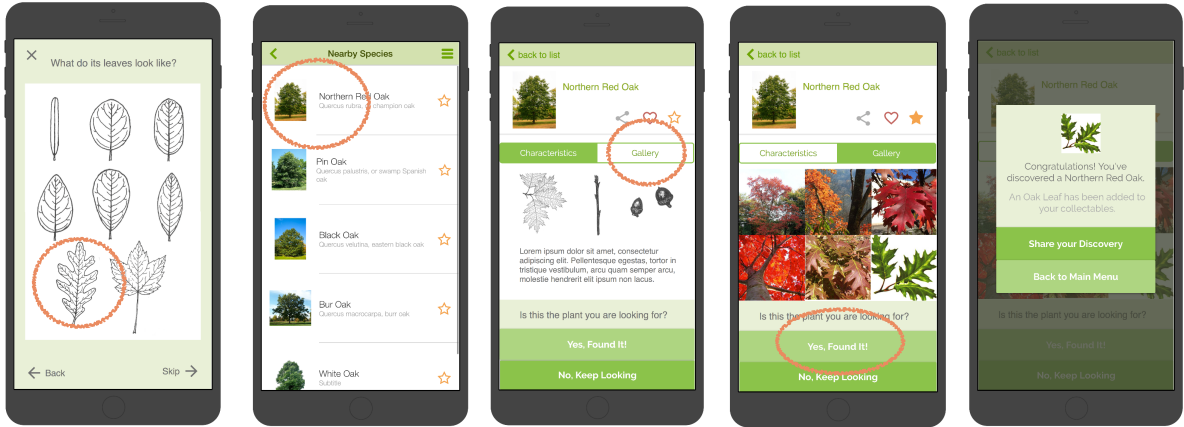
Based on the functionalities listed above, there're two interaction flows most likely to take place in actual use of Proxibio:

(1) After seeing a mysterious creature, the user launch into Proxibio, taps on "Identify". The user goes through 2-3 prompt questions, which then leads to a list of identification results. The user taps into an item, scans through the core characteristics of the species, and looks at the photo gallery. If the information matches the species found, the user taps on "Yes" button and receives a congratulation message. The user can also choose to keep browsing, or save the species for later look-up. Upon each successful identification, the user will receive a new collectable and be prompt to upload photos share their experience. Their discovery will also be displayed as a marker on the map view of the species.

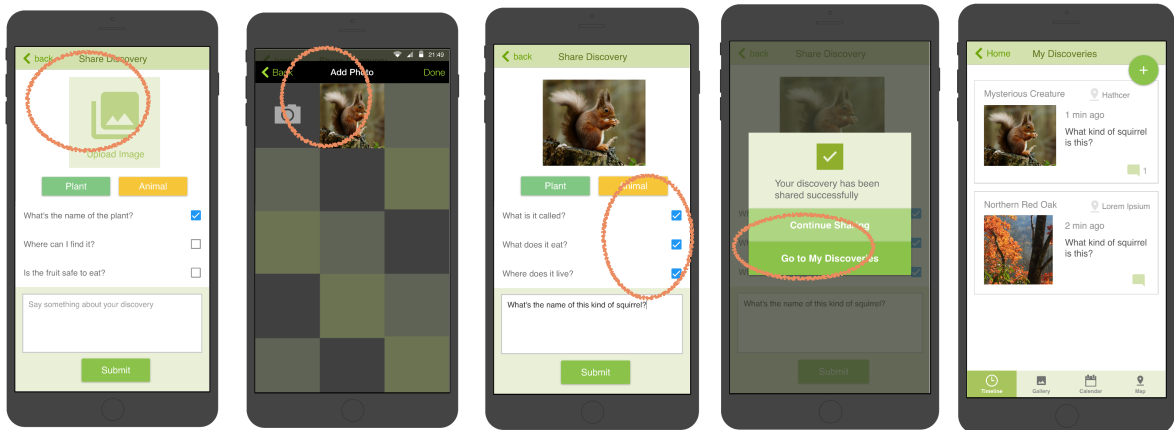
(2) The user wants to share his discovery of an interesting fact about a species. The user enters Proxibio, taps on "Upload" and selects a photo from the phone album. The user can check the preset questions they want to ask about the species, or they can put in their own comments about the discovery. Upon receiving the success message, the user may choose to keep sharing or go to the profile page to check on recent discoveries.

Under the theme of user-centered design methodology, the design employed the approaches of sketching, storyboarding, cultural probes, paper prototyping, user testing, and finally become fleshed out in digital prototype. The digital prototype was built on the online program "proto.io", with graphic assistance done in Photoshop.

Most of the main concepts and functions of this design are included in the digital prototype. However, some detailed functions are not yet implemented due to time constraints and other priorities, including personal favorite, social activity feed, sort button in the catalog, calendar and map view of the personal discovery page.



Flow 1: Identify Species



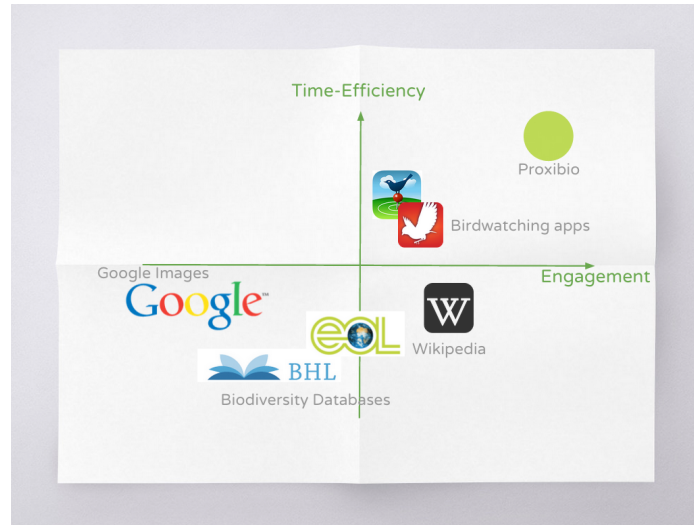
Flow 2: Upload Discovery

4. Design Process

a. Preliminary Research

The initial idea of Proxibio was to build a biodiversity knowledge system with resemblance to scientific knowledge systems, only easier to use and less demanding in users' knowledge basis. After gathering a general understanding of the local community and drawing from theories in scientific informatics, I came up with basic system functions including to offer understandable, credible and accessible knowledge, link species information together, and provide an engaging and interesting learning experience.

A comparative analysis was conducted right after defining the central values and principles of the system. By analyzing strength and weaknesses of different kinds of systems related to biodiversity, I gained some inspirations on the actual functionalities of Proxibio, as well as a better understanding of how this app might be situated in the local context.



A simplified demonstration of competitive analysis

The design approach that took guidance in the preliminary research phase was primarily value-sensitive design, which starts from core principles such as salience and credibility of information, combines considerations of user engagement, and then ideate solutions that embody these values.

b. Ideation

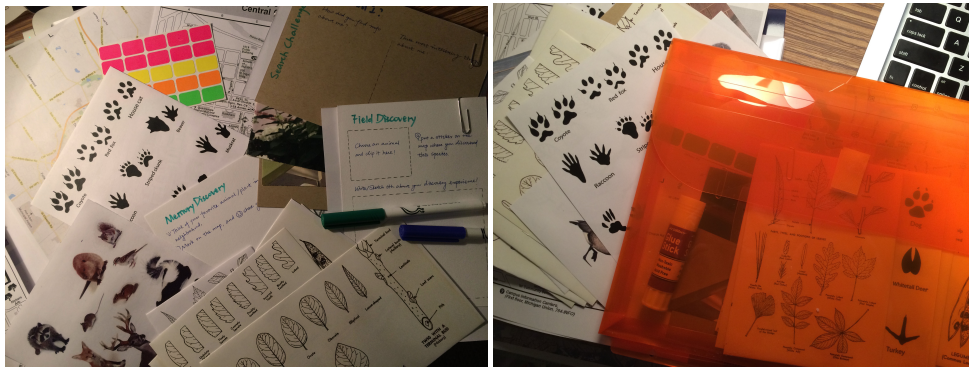
The ideation process started with brainstorming and sketching out alternative solutions, where 40 ideas were illustrated on a single digital canvas. This was an essential step that offered inspirations and references for the later design and implementation phases and ensured the project could smoothly proceed through corrections and iterations.

The following step was making and distributing cultural probes to test the hypothesized solutions in the sketching phase and to spark more inspirations. The probes included photos, maps, stickers, cards with prompt questions, and blank materials for users to use to their will. The cultural probes were distributed to three users who have moderate interest in local species for a week. The retrieved probes provided valuable information about what aspect of information users might be interested in, how they chose to share information, etc.

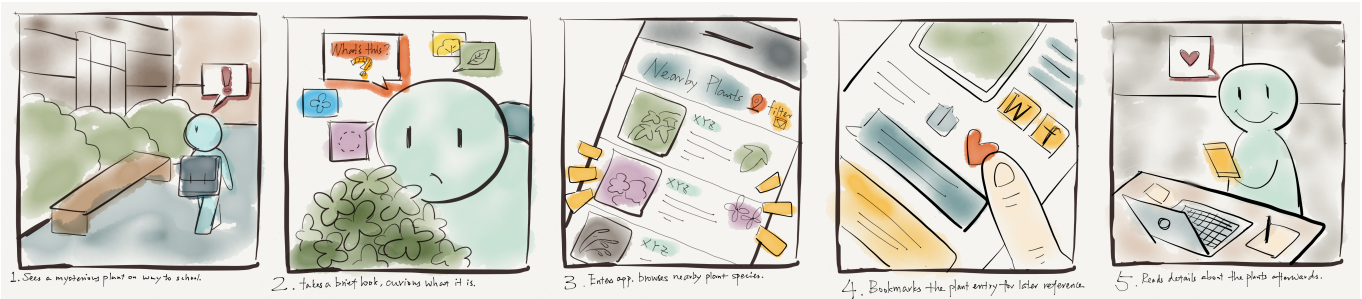
These data from the cultural probes were then used in storyboarding, where the ideas were selected, refined, and framed into user experience. Although storyboards in this phase are highly idealized, they serve as a major guidance to the later stages of design work, and is still clearly presented in the final prototype.



Sketching Alternatives



Preparing cultural probes



Storyboards

The main design approaches used in the ideation phase were critical design and reflective design. While reflective thinking kept me aware of the values I'd unconsciously embodied into the design, critical design enabled me to turn these unseen values into inspirations and workable solutions. Both approaches helped me explore the design space and made me more mentally prepared through the design process.

c. Prototyping and User Testing

The prototyping phase include iterative design and testing of low-fidelity and high-fidelity prototypes. The project from here moved from general ideas and overarching values to practical implementation, with considerations in feasibility and other real-world constraints.

The paper prototype method enabled quick testing of design ideas in a cost-effective manner. The prototype used a cardboard phone frame, as well as paper cards as pages, sliders, and notification toasts to imitate an interactive mobile system. The main purpose of this prototype was to present several core functions (identification, browsing, and uploading) to users who had no previous knowledge of the system design, and see if it is understandable, easy to learn, and able to realize its purpose. In user testings, each user was asked to go through the system to complete a specific task. All users were able to quickly understand the system concept and smoothly navigate through the design flow. The feedback I received were mostly on the navigation problems, choice of words in prompts and buttons, and the unity of experience from a user's point of view. The overall positive evaluation also convinced me to carry on certain parts of the system design into the next step.



Paper Prototype

The digital prototype combined the feedback and suggestions from the low-fidelity prototype testing, and also added small features that smoothen user experience, such as control panels, tab menus, pop-up messages, etc. The species information page used when identifying species was also redesigned to face users' specific needs. The prototype went through another round of user testing and small changes, and finally came into the current form.

In general, the changes during the whole design process was relatively smooth and predictable. This is partly due to the wide range of alternative solutions in the ideation and sketching stage, where the design space was broadly defined and plenty of choices were readily provided. This allowed more room for selection and trade-offs in the later implementation phases in a more efficient way.

Digital Prototype Link: <https://janezmt.proto.io/share/?id=5f93d89b-0764-4c4a-a962-be7802f052d5&v=4>