St Andrews Botanic Gardens Database UX Design - Sketches and Concepts

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Introduction and Report Authorship

For the second assignment in the St Andrews Botanic Gardens Database Web Portal UX Design project, the team drew on the previously conducted contextual enquiry to produce the first sketches and concept designs for the product.

Approaching this process, all of us sat down to first gather inspirations and ideas on a so-called mood board. The mood board proved itself valuable in all consecutive stages of sketching, providing a common understanding and source of inspiration for all team members in their individual efforts. After making the mood board, we got together to recap the results of the contextual enquiry and analysis, and to specify the scope and areas of interest of the project. This step was essential in preparation for the actual sketching-to-come.

Generally, the authorship of the report comes down to an even group effort. While we all went out to do our own sketches after creating the mood board and scope, everyone sketched an equal amount, and everyone's skecthes were used in the report. Furthermore, we wrote much of the report together, and therefore it can be argued that the no section can be solely attributed to one lone person.

Figure A.

Figure B.

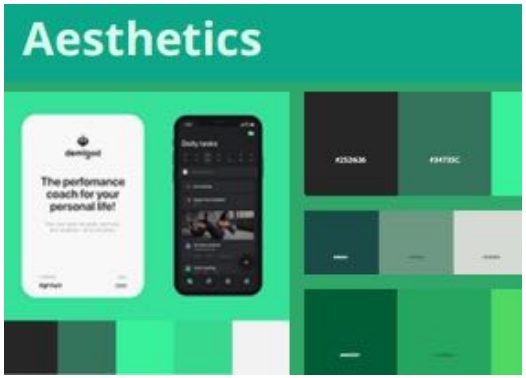


Figure C.

A Mood Board Summarises Inspiration

Before approaching scenario and concept sketching of the Web Portal, the team first gathered to create a mood board. The purpose of this was to brainstorm, share, and summarise inspirations and ideas for the coming work. As seen in Figure A, the mood board touches on moods and themes, aesthetics and inspirations, as well as ideas for usability and features. Overall, the mood board was immensely beneficial for the team in the process of brainstorming and sketching ideas.

Figure B. – Zooming In: Maps

An example of a central theme drawn from the data elicitation process is the notion of interactivity displayed through maps. In the mood board, we explored what visual cues within maps inspired us. This jogged our creativity to start thinking about map functionality within our domain.

Figure C. – Zooming In: Aesthetics

Topic-words (in light green) are scattered throughout our mood board. These words were the first artefacts we added to the board and provided inspiration for the aesthetics we would like to create in our Web Portal. Since we are looking to design a web portal for a botanic garden, we immediately honed into green colours for our central colour scheme. While looking through various shades and combinations of green colours, we all agreed on a palette of what we described as 'modern' green colours offset with white and black. We also took the opportunity to look at various fonts that also fit this atmosphere/experience we are hoping to achieve.

Scope and Areas of Interest

In the previous assignment, contextual analysis and inquiry was conducted. Consequently, we were informed of areas of interest to focus on, users involved, and constraints present. These aspects serve as justifications for the choices made during the planning and sketching process.

There are multiple users and stakeholders involved with the Web Portal. As outlined in the contextual enquiry, three user groups of the Web Portals are identified: Managers, General Staff, and Outsiders. In the same order, these three user groups also need decreasing levels of access and functionalities. As far as our interests go, the Team is therefore faced with the task of designing a solution that caters to all three types of users. Stakeholders, on the other hand, include the Director of the garden and the St Andrews Botanic Garden Trust. The team therefore carefully considers the wishes of the stakeholders to deliver a product that satisfies the communicated needs. Nevertheless, more innovative ideas are also developed as add-ons to push the boundaries of the core concept and offer the stakeholders so-called "out-of-the-box" ideas.

In designing the Web Portal, the team's main challenges lie in accommodating for all three user groups. While a visitor might simply want to look up a plant they found in the garden, the curators of the Garden need more capabilities, such as modifying data in the database. Furthermore, given this dichotomy between user groups, a challenge is to find a solution that is both simple & intuitive, and advanced. Overall, the Web Portal needs to be able to provide a platform which can effectively search the over 18 000 individual plants, including their 229 categories. On the highest level, the curators need to be able to track plant data, add and remove entries, give access to multiple different parties, and generally work as a catalyst for re-sparking the scientific mission the Garden once upon a time had. At the other end of the spectrum, a visitor should be able to search the database and use an interactive map without issues. For some of our more advanced ideas, a challenge is naturally the implementation of these. Considering the vast number of plants in the garden, modifying for example the existing physical labels may be a serious challenge in itself.

As a result of the contextual inquiry and the client interviews, the team had a good understanding of what the client wished for and what kind of choices needed to be made going into the scenario and concept sketching process. The client's basic vision for the web portal was straightforward, and the team's core concept has therefore not deviated from the wishes communicated during the interviews. However, issues such as ease of use and accessibility were brought to the fore both by the client and by Garden Staff members. To accommodate these worries, we also developed more innovative sketches. These sketches are hereafter referred to as our "advanced" concepts. Furthermore, the issue of different users was also clearly prominent during the research part of the project, justifying the team's emphasis on catering to the three generalised user groups.

Overall, the core of our interests is the previously discussed web portal for the botanical garden's new database-to-be. The web portal requires a simple but effective design to access the underlying database. It is this user experience (UX) that the team is designing, including envisioning and planning looks and approachability, functionalities and efficacy, intuitiveness, and accessibility. For example, the team not only explores colour schemes, but also capabilities such as downloading specific data, locational plant info, and much more. It is, however, important to note that the team's area of interest is strictly limited to the user experience of the portal and its users. It does not reach the design of the database itself or the specific information provided by the database. In no particular order, some of the core areas of interest depicted through sketches are use-scenarios of the portal for

different user groups, scenario sketches pertaining to search methods for different user groups, user-group oriented concept sketches of the portal itself, and concept sketches of features of the web portal. Examples of major features include different data management methods and for example an interactive map. Throughout these sketches, both a baseline, and some more advanced, sketches were developed. The baseline sketches and concepts are designed to closely follow the wishes and requirements drawn from the contextual inquiry. Here, we limited our attention on the user experience of the managers and general staff, ensuring they, as the highest priority users of the web portal, have smooth and seamless experiences with data queries and manipulations. Meanwhile, the more advanced concepts are innovative approaches and new ideas considered to better the web portal as a whole. Based on the baseline sketches, advanced features were designed and discussed. We would like to better integrate the outsider into the web portal, expanding the function of the website from a data search tool to one that brings intellectual and emotional value to the user by considering different types of interactive maps, and other detailed functions. As such, the advanced features could be considered add-ons or extras. As seen in the sketching sections, we first introduce the topic with the baseline in focus, and then expand towards our more novel ideas.

Scenario Sketches

Scenario sketches helped us visualise and communicate the different areas of interests outlined above, such as specific contexts the web portal may be used in and placing the system in a use setting. In doing so, scenario sketches were a valuable step in also describing the *what*, *when*, and *where*, in addition to the *how*.

Figure 1. - Basic Visitor Plant Search Scenario

For the most basic usage scenario, a visitor of the garden is envisioned to find a plant of interest and wants to find out more information than just what the plant's sign conveys. The user then uses their phone to navigate to the search page of the web portal and finds more detailed information on the plant of interest.

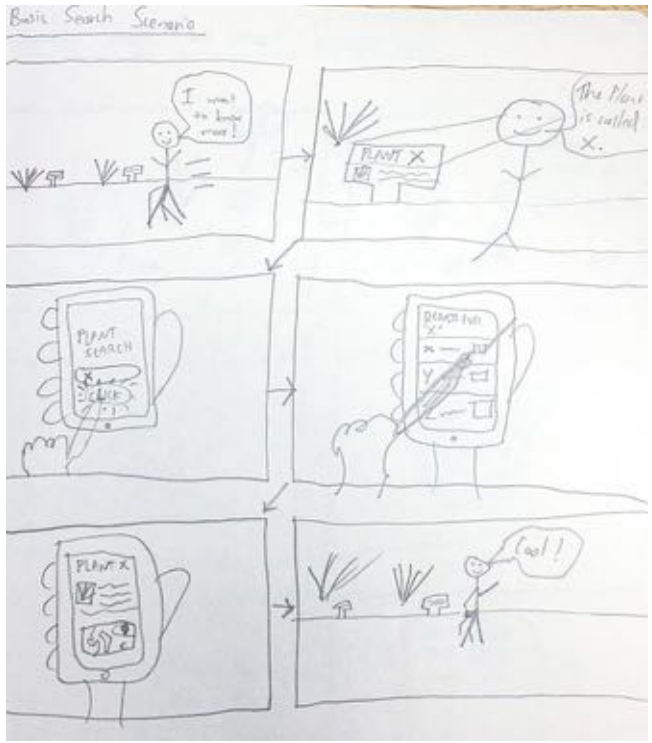


Figure 1.

Figure 2. - Garden Staff Plant Search/Information Update Request Scenario Sketch

From our interviews with the garden director, we gathered that a common use-case for garden staff is carrying out audits on the plants over a specified period of time. Nevertheless, only curators have access to modify the database data. In this scenario, the

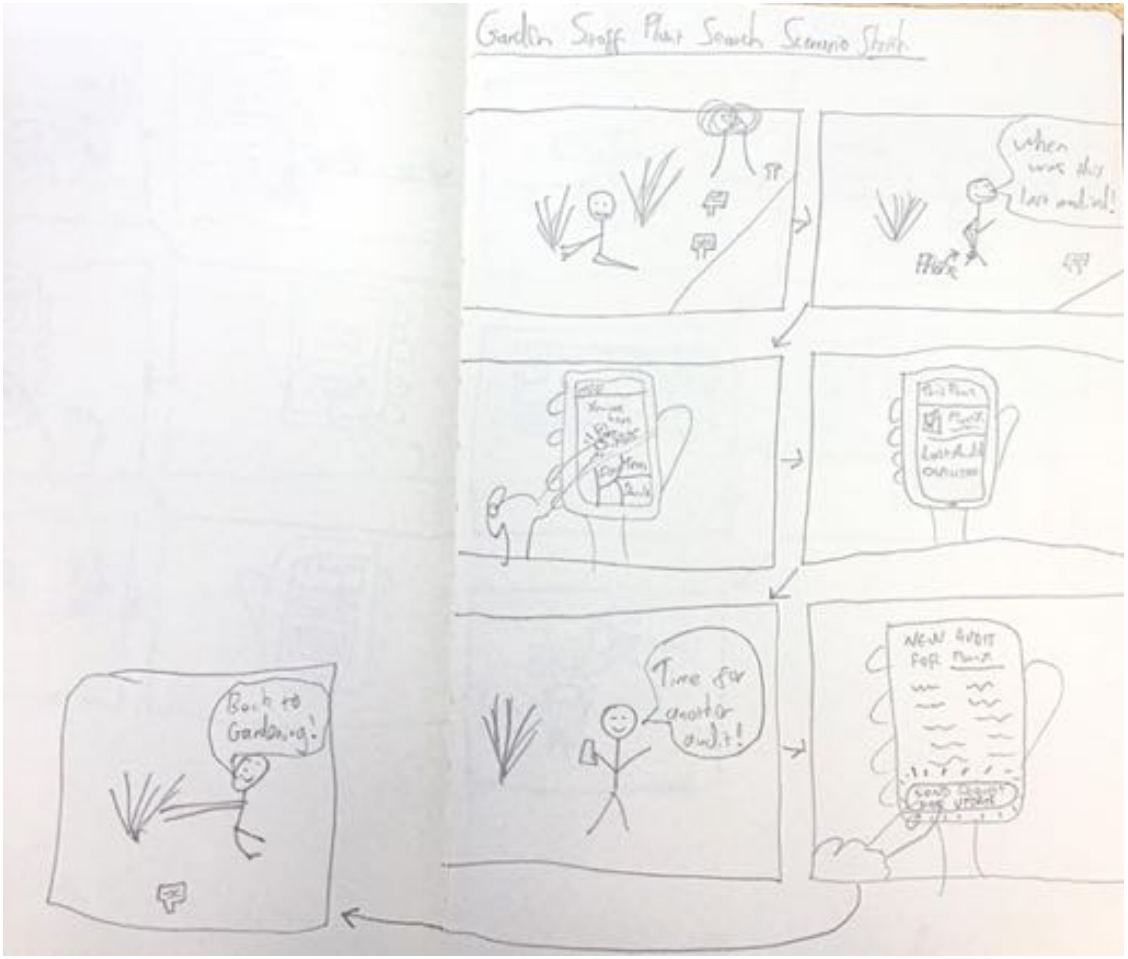


Figure 2.

Figure 3.

gardener wonders if a plant needs an audit but is pressed for time. They use their current location to quickly search for the plant on the web portal's interactive map functionality and find that the plant needs an audit. They login to the web portal as a staff member and fill out a new audit entry with relevant information for the curators to approve and add to the database. Now they can get back to gardening!

Figure 3. - Curator/data manager Scenario Sketch
One of the main uses of the web portal is managing the database. In this case scenario a staff member with access to the database works with it. Crucial usability features are adding, removing, and editing entries, being able to use the interactive map in unison with the database, and efficiently working with the overall data and its many categories.

Figure 4. - Researcher Plant Search Scenario Sketch
In line with the goal of advancing the garden's scientific research mission/purpose, we envision a remote researcher accessing the database. This scenario sketch shows the researcher wanting to conduct a search for plants of interest. They search for plant X, click on the top search result, and find it to be relevant. They then save that plant to their saved tab. With the save tab, the researcher can keep track of all relevant plants from searches, enabling them to continue searching without worrying about losing their previous results, or having to manually keep track of results. The saved tab therefore acts as sort of a short-term memory.

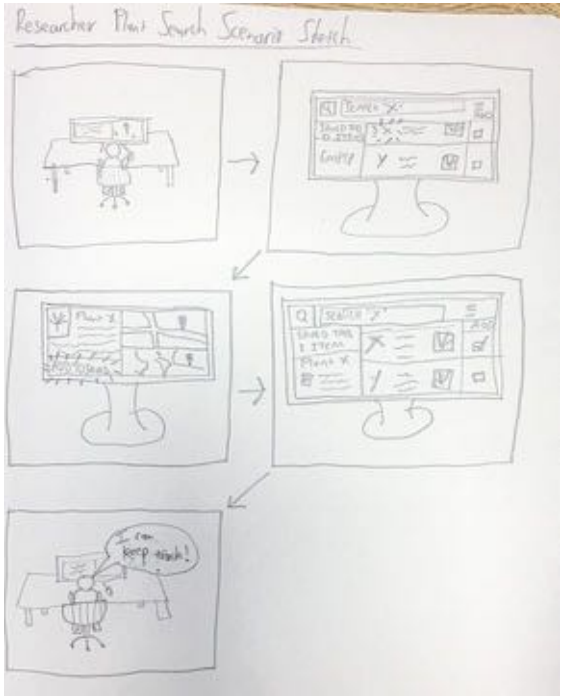


Figure 4.

Figure 5.

Figure 5. - QR Codes Scenario Sketch
While discussing more creative ideas, the Team identified some possible advanced avenues of interest. We are considering the use of QR codes and/or image recognition through neural networks to enable quick and intuitive information retrieval from the plant database. During data elicitation, we found that respondents to our survey (particularly visitors) regularly noticed the signs in the botanical garden, making them a natural hotspot of focus. Paired with the notion of seamless usability being important, QR codes were deemed a good idea to search for plants. In this sketch, a user wants to find more information about a plant. After noticing the QR code on the sign, they scan the code, which takes them to the corresponding page on the web portal.

Figure 6. - CNN Plant Recognition Scenario Sketch
While QR codes are a modern and intuitive way of accessing websites, the idea comes with the problem of producing up to 18 000 unique codes in physical form for individual plants. We therefore continued exploring the idea of intuitive searching (without manual typing etc.) in the realm of image recognition. Figure 6. sketches the use of a convolutional neural network, with users simply pointing their phone's camera at a plant, the application recognising said plant, and automatically being redirected to the relevant page on the web portal. While a much more technologically advanced feature, such an implementation could be achieved by buying such technology from an outside supplier.

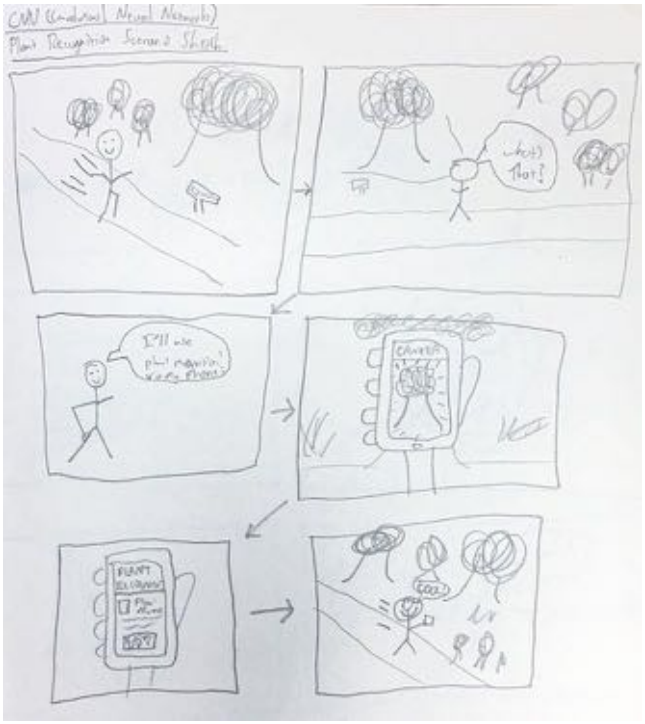


Figure 6.

Concept Sketches

We considered the scenarios depicted above and applied our ideas and the client's wishes from the mood board and data elicitation process to create concept sketches.

Figure 7. – Website and the Map

The garden main page illustrates an interactive map, which has various icons on it. Upon clicking an icon, details for the plant in that location are displayed. On the main visitor's page, general plant information such as name and location will be included in the details. A visitor is also able to access more advanced information about a plant through the advanced search tab displayed. When clicking on a plant's location information, it will open the map feature and lead them to the plant.

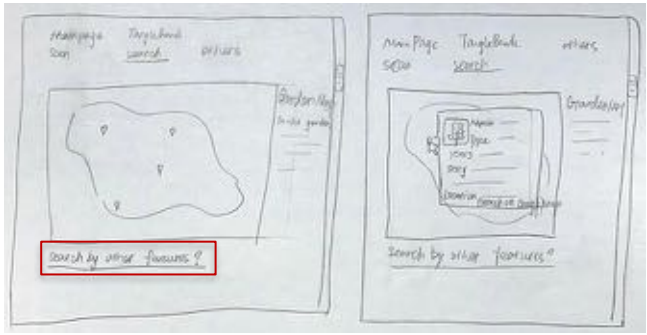


Figure 7.

Figure 8. – Search Engine

Inspired by the university library website, we provide an advanced search feature in the web portal. When 'search by other features?' (i.e., advanced search) is clicked, the garden webpage will jump into a search engine containing all the accessible information in the database. Here, there can be options like name, origin and so on. This feature allows users to search the database based on very specific information about the plants in the garden. For example, an outsider such as a researcher may want to search for plants of a certain colour, or a combination of certain features such as name, dimensions, and colour.

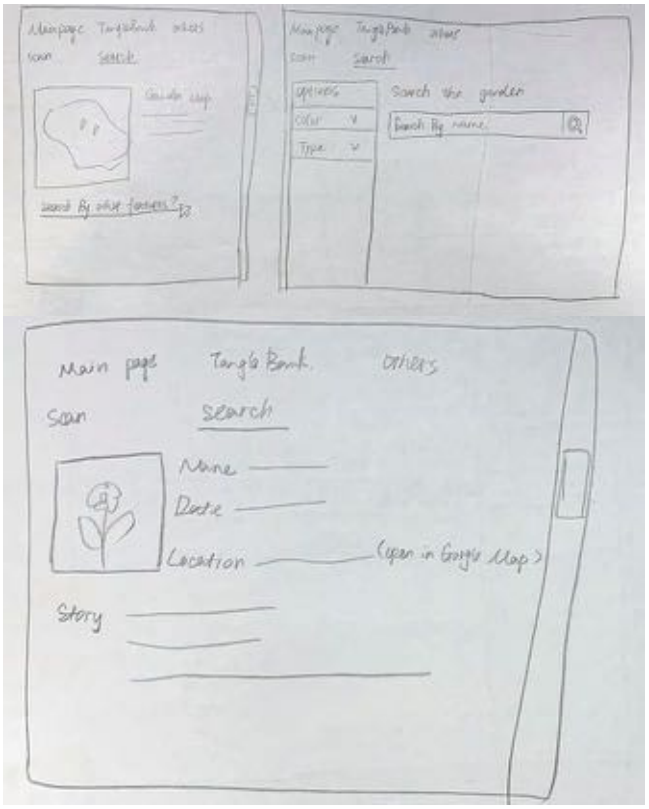


Figure 8.

Figure 9 - QR Code Search
By scanning a QR code from a plant's label, a user can access the plant page and instantly access general information on their screen. Moreover, we can design some functions like uploading the plant photo to search the classification instead, since PCs might not be so supportive to the scanning features.

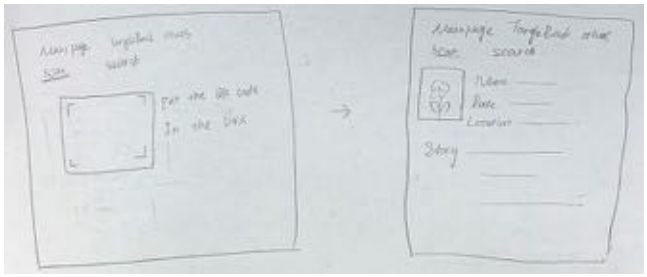


Figure 9.

Figure 10. – Landing Page with Managerial Access
A crucial aspect to take into account in the design of the web portal is the different needs of the various user groups. For curators and other staff members who need easy access to the database, the interface and its accompanying user experience must be advanced enough to provide all the necessary tools to manage the database. Meanwhile, visitors and other casual users benefit from a simple, search-engine-like interface with a search bar and access to the interactive map. To solve the dichotomy, the simple interface is envisioned to have a login feature, from which managers of the database can access the more advanced site.

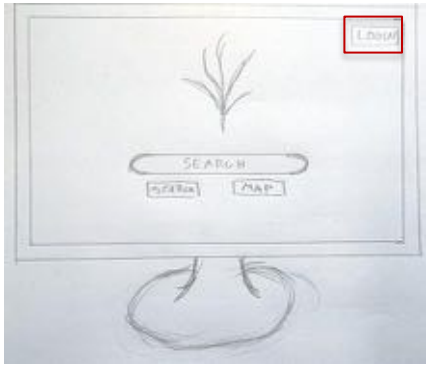


Figure 10.

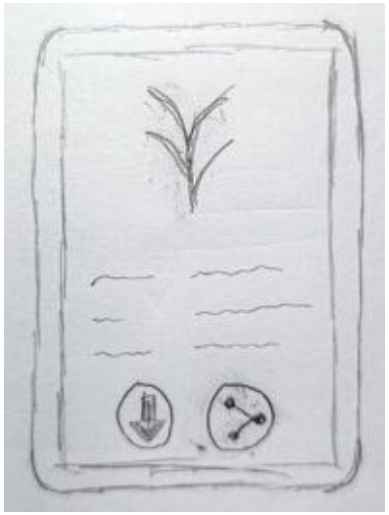


Figure 11.

Figure 11. – Download and Share Data
When looking up specific plants and data, another crucial feature is to be able to download said data. Our survey responses indicated the importance of this. For an advanced feature, we explored the option of being able to share the data, by for example clicking a share button.

Data Manipulation for Curators
In general, the curators have the highest authority to manipulate plant data, including searching, inserting, updating and deleting data. These capabilities are to be accessible to all curators, even without programming backgrounds. This portal also provides a function to allow users to add self-defined scripts to improve the efficiency of data access and perform related data processing. These scripts could for example automate a process using R or Python. Curators also receive and handle requests from staff who do not have the right to manipulate data directly. For this, a "data diary" is envisioned for curators to see historical changes to the data. Curators can also add/delete data manipulation rights of staff members and add "full-access accounts" for outside researchers to allow them to access and download data they want.

As mentioned in the previous section, managers, general staff, and outsiders have different levels of access of functionalities. Hence, we mainly sketched interfaces for managers, while interfaces for other user groups draw from these same sketches in a simplified way.

Figure 12. - Search data
When searching plant data, users can select the data they want by using the filter, and by clicking the "advanced" button, users can select the data that meets the appropriate criteria. For example, they can select all pine trees planted after 2015.

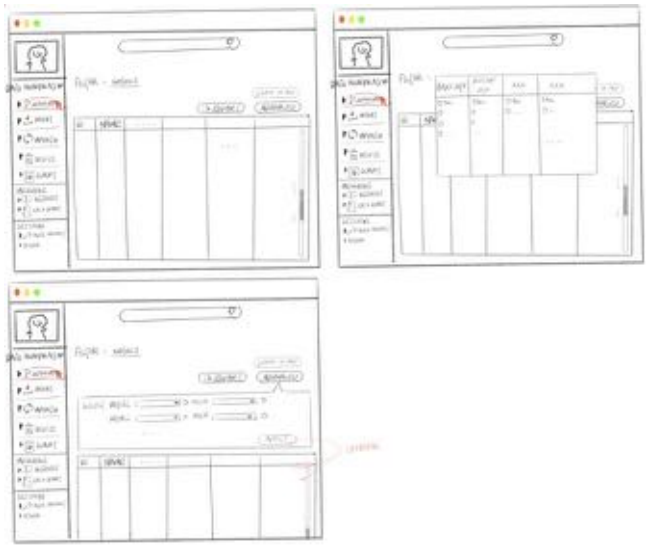


Figure 12.

Figure 13. - Insert data
Users can upload new plant information. In addition to the mandatory information, they are free to fill in other relevant information to be updated later in the process. It is worth mentioning that the plant ID and the registrant cannot be changed, the former is automatically generated by the system as a unique ID and the latter is identified by the system.

Figure 13.

Figure 14. - Update data
Users can select and update existing data via using filters, or query and modify data by entering keywords or plant IDs in the top input box.

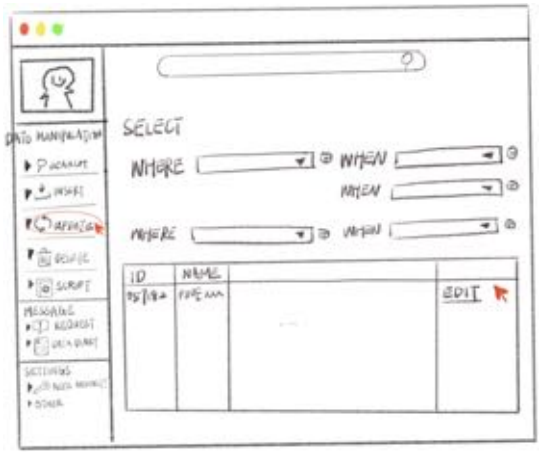


Figure 14.

Figure 15. - Delete data
The data deletion interaction interface is similar to the data update interaction interface. The reason for presenting the two functions on separate pages is to avoid user error.

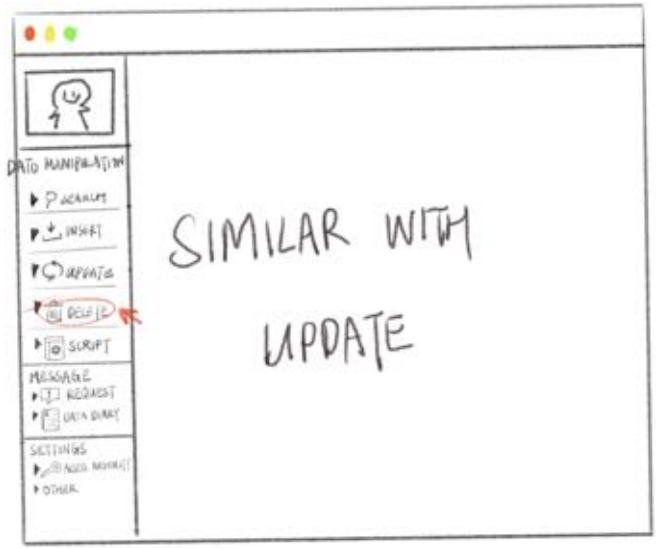


Figure 15.

Figure 16. - Receive request
For the "Request" function, the curators can use it to receive requests for data manipulation from staff. If the staff wish to alter the data, they must be approved by one of the administrators.

Figure 16.

Figure 17. - Data diary

Curators can view a history of data manipulations over a recent period of time. If there are any errors in data inserts, updates or deletions, they can use it to find the corresponding person in charge and restore the data to before the modification. A more advanced feature is that the diary would allow the user to generate data visualisations of the plant data they want. The data visualisations can be customisable graphs of useful data, as decided by the user, like how many visitors the garden receives over a month, how many trees are from a certain country, and many other options. One thing we noticed from our observation session with our subject-matter-expert is that garden curators and directors regularly work with vast quantities of data, so we thought it would be beneficial to use graphs to visually summarise complex data.

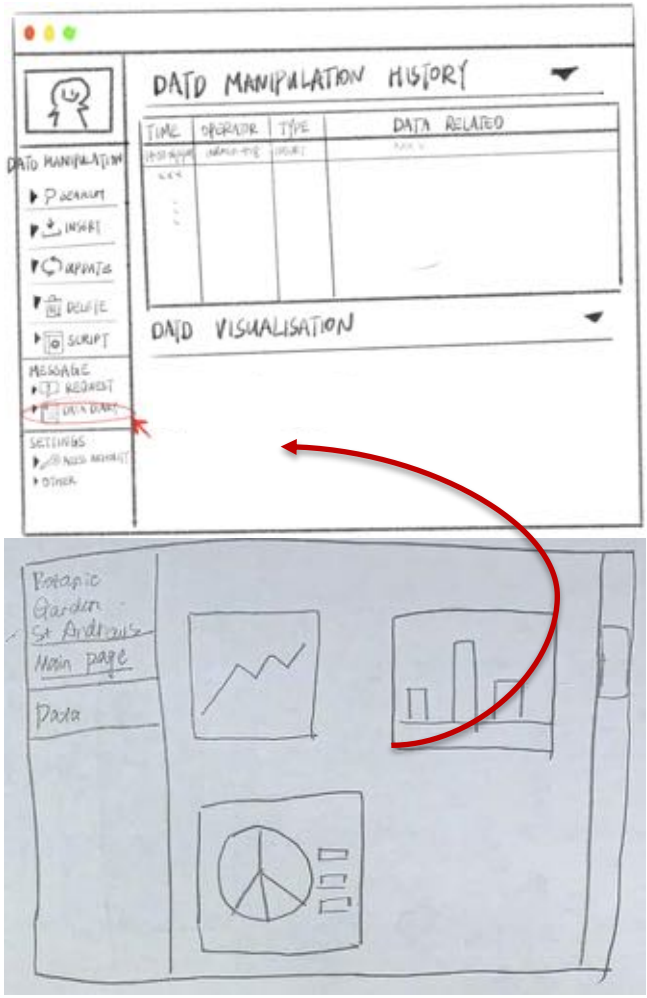
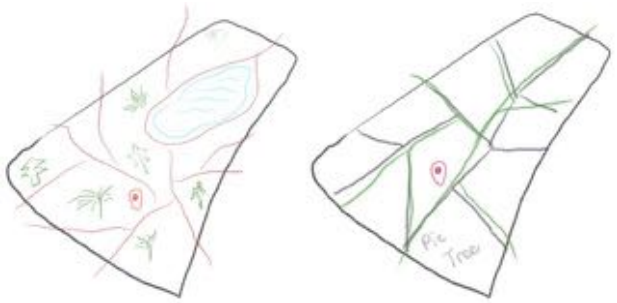


Figure 17.

Figure 18. – Authorising database users

The authorisation capability allows for curators to grant database access to other staff members or outside researchers.

Figure 18.



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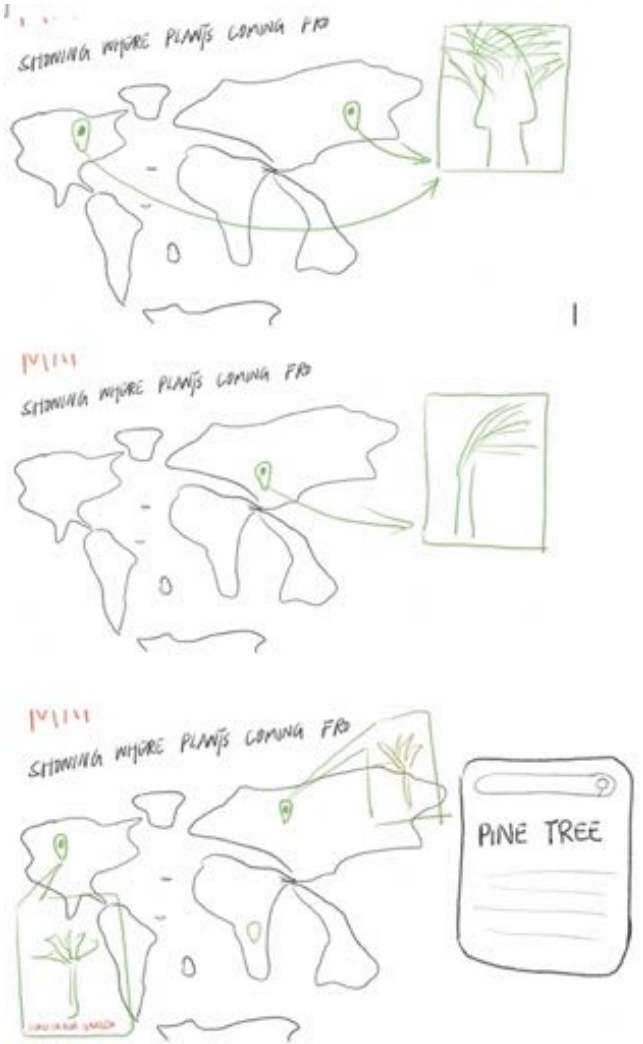

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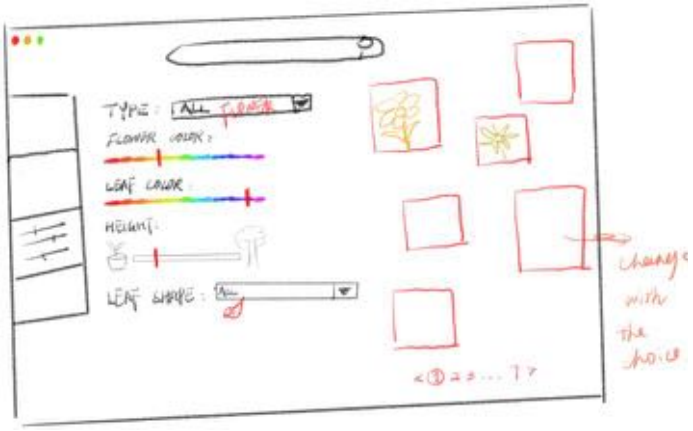

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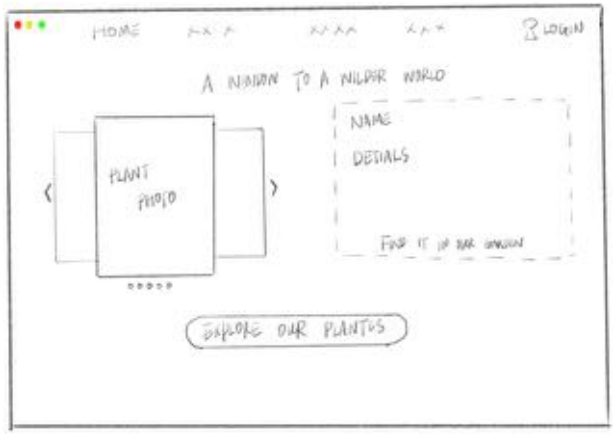


Figure 22.

Figures 19 to 22 - Mapping, Zooming, other and advanced capabilities

Figures 19-22 depict a range of depictions pertaining to the visualisations of some capabilities. Figure 19 explores both an option with icons for different kinds of plants and trees, and an option with the map being modular with texts to describe the areas. Figure 20 shows an alternative design, where the map can be zoomed out from to reveal a worldwide view with origin data of a specified plant. Figure 21 suggests an advanced search technique by plant colour and other characteristics. Finally, Figure 22 examines a possibility of a homepage with "scrolling cards" for another "out-of-box" idea. The idea is to get the user involved more in the web portal as it is more interactive and shows the cards easily.

Conclusion

In conclusion, the above sketches and inspirations will guide the project as it enters the stages of higher fidelity prototyping. We believe these sketches make a good overview of what is needed, as well as what is possible.

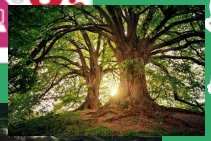
APPENDIX A - Mood Board

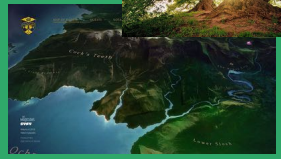
St Andrews Botanic Garden

Database Web Portal Mood Board

Explore!

QR Codes on plants!





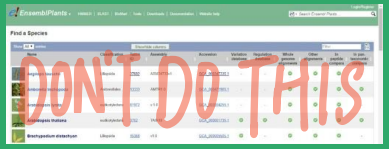
Capture Attention

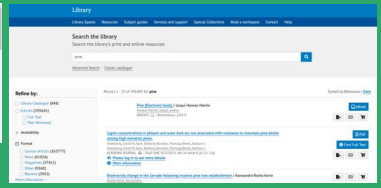
Colourful

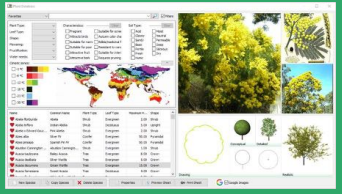
Cartoon/Animated?

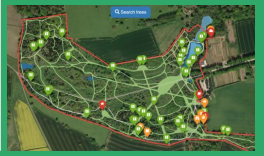
Search by category!

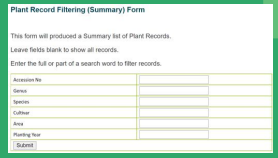
Information Visualizatin





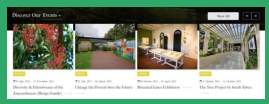






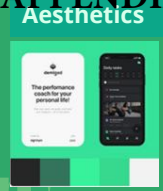
Simple but functional

Interactive!



Events on page

Aesthetics



Vibrant!

Energetic!

Captivating

Minimalistic

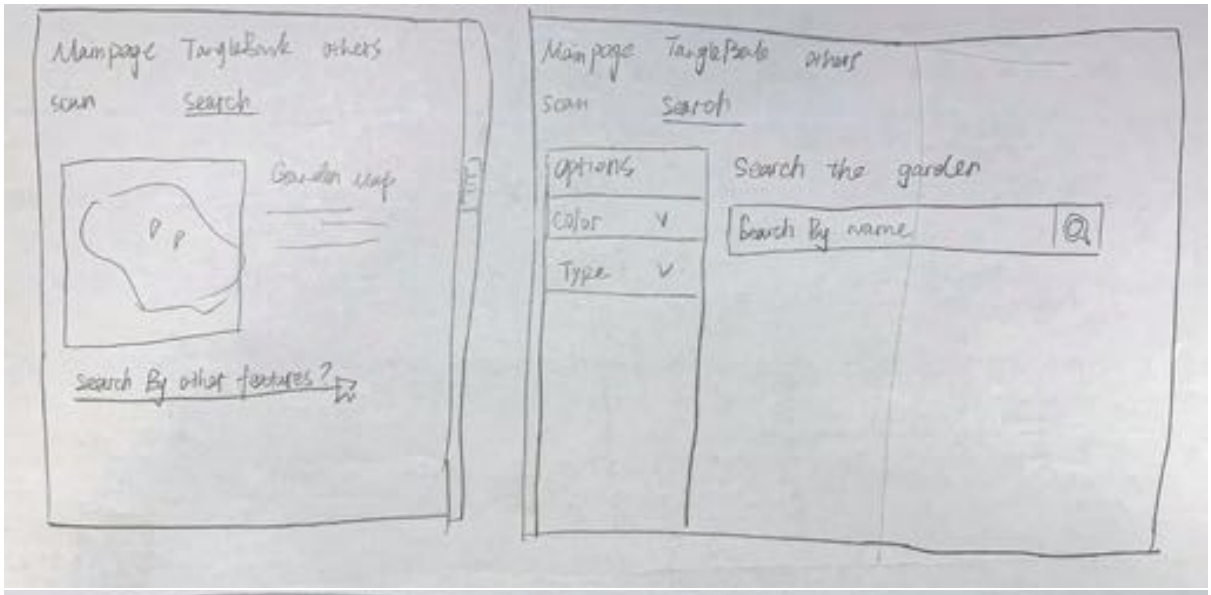
Simple

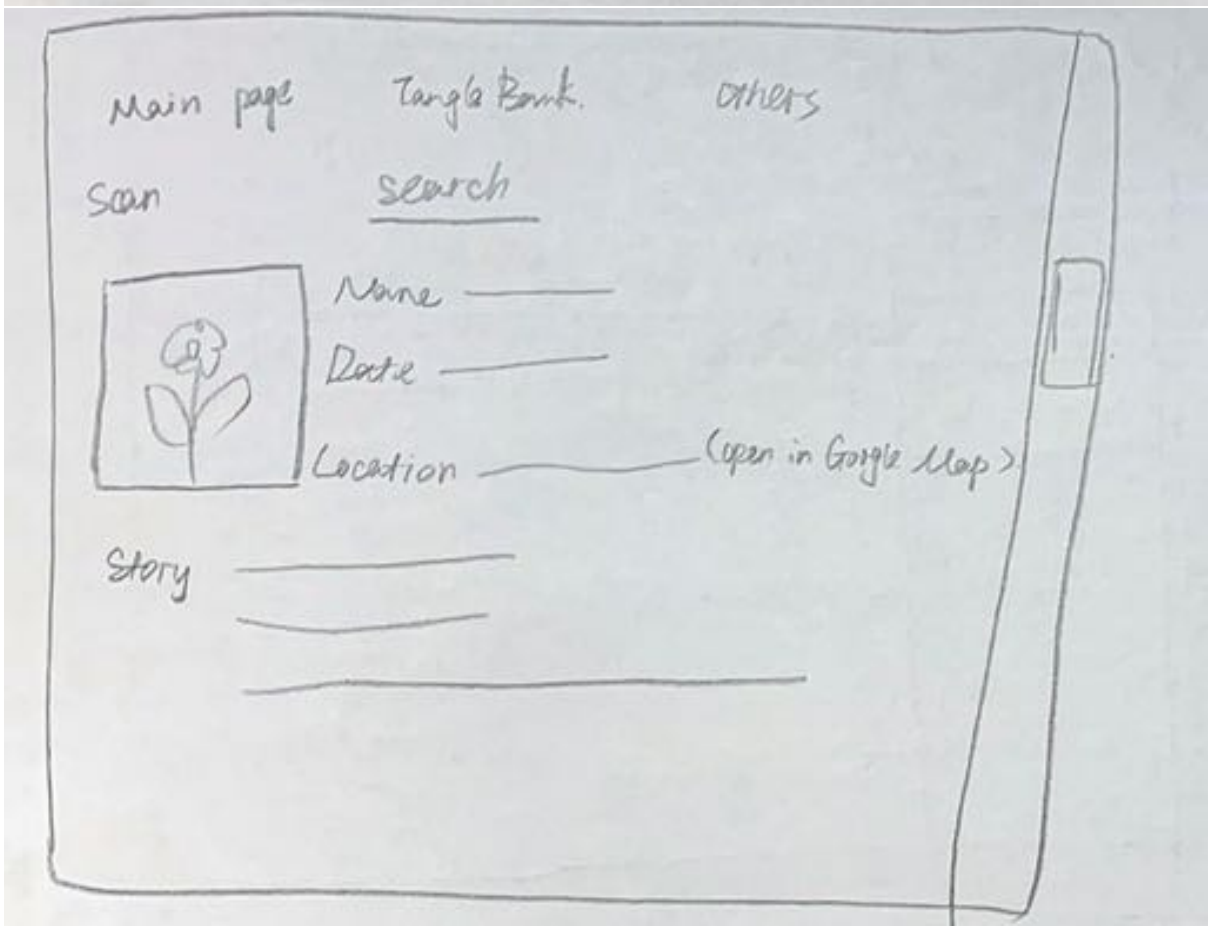
Info Cards?

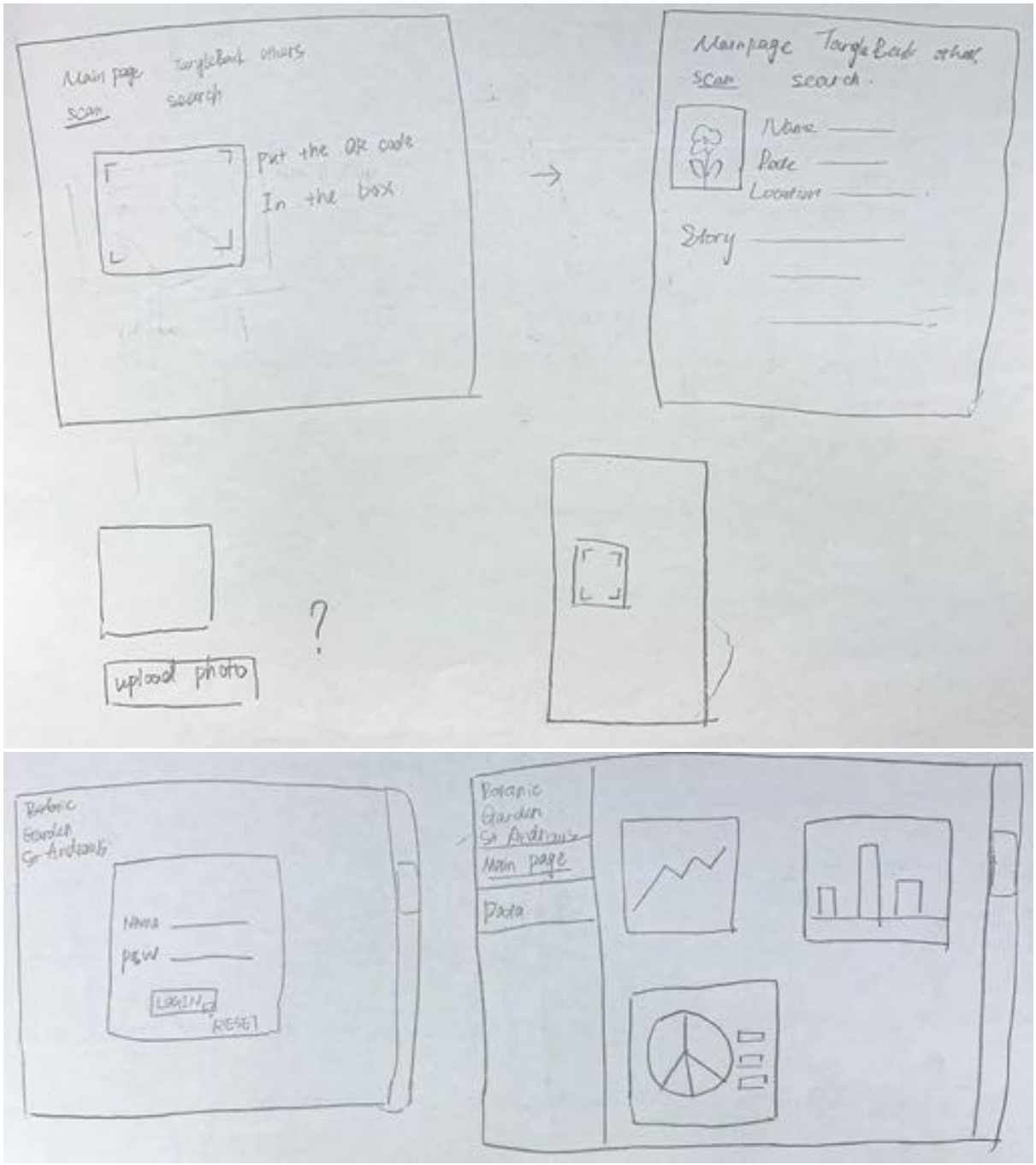
Approachable

Exciting!

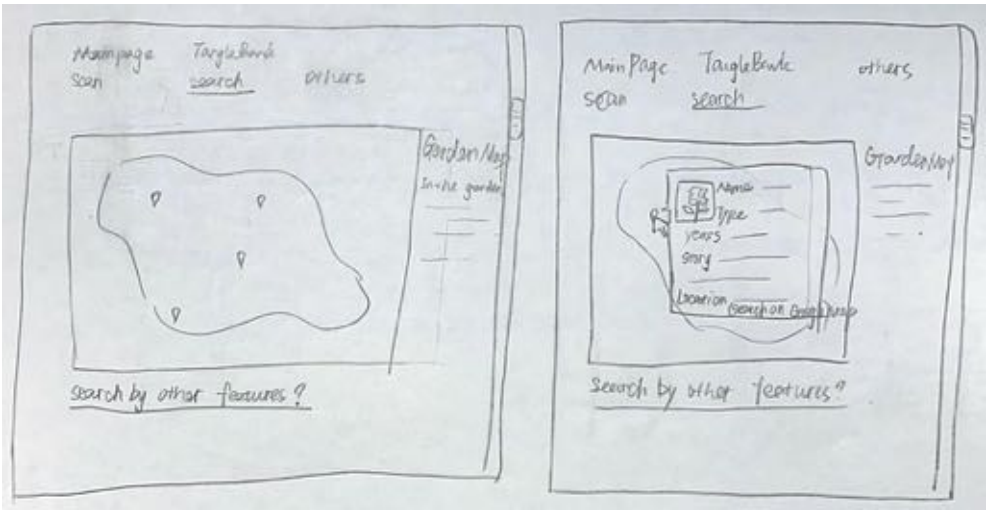
APPENDIX B - Sketches



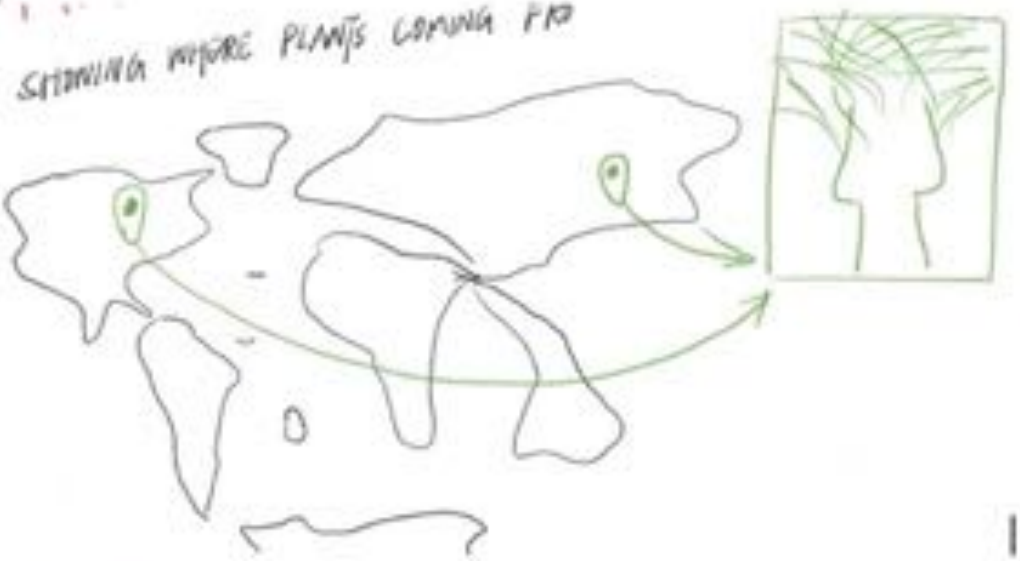



Main page
scan
search
put the QR code
In the box
Mainpage
scan
search
Name
Date
Location
Story
upload photo
?

Botanic
Garden
Sg Admiralty
NRIC
PSW
LOGIN
RESET
Botanic
Garden
Sg Admiralty
Main page
Data


Mainpage
TangleBank
Scan
search
others
Garden Map
In the garden
search by other features?
Main Page
TangleBank
others
Scan
search
Garden Map
Name
Type
years
story
Location
search on Google Map
Search by other features?

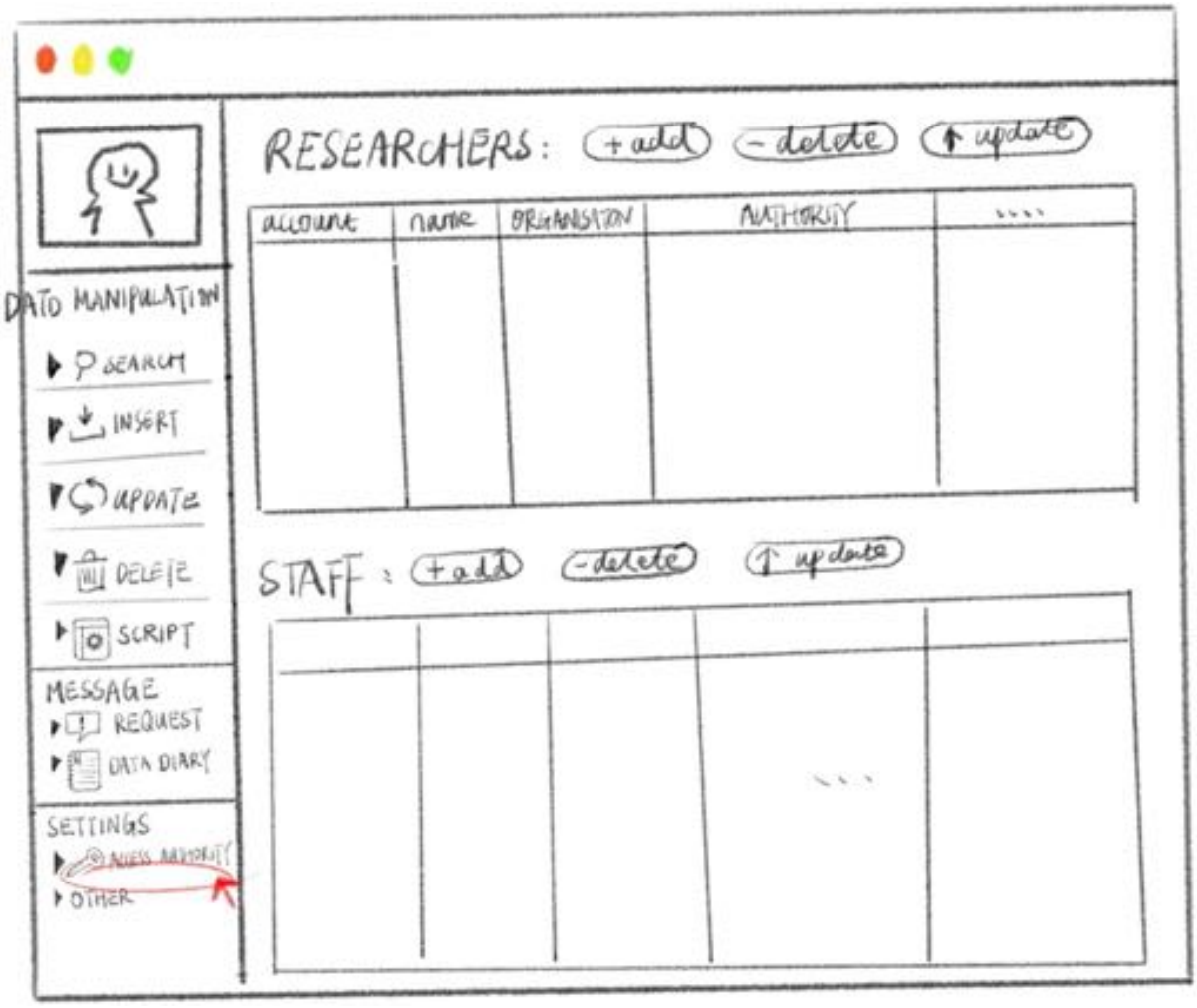
SEEDLINGS NATURE PLANTS COMING FROM



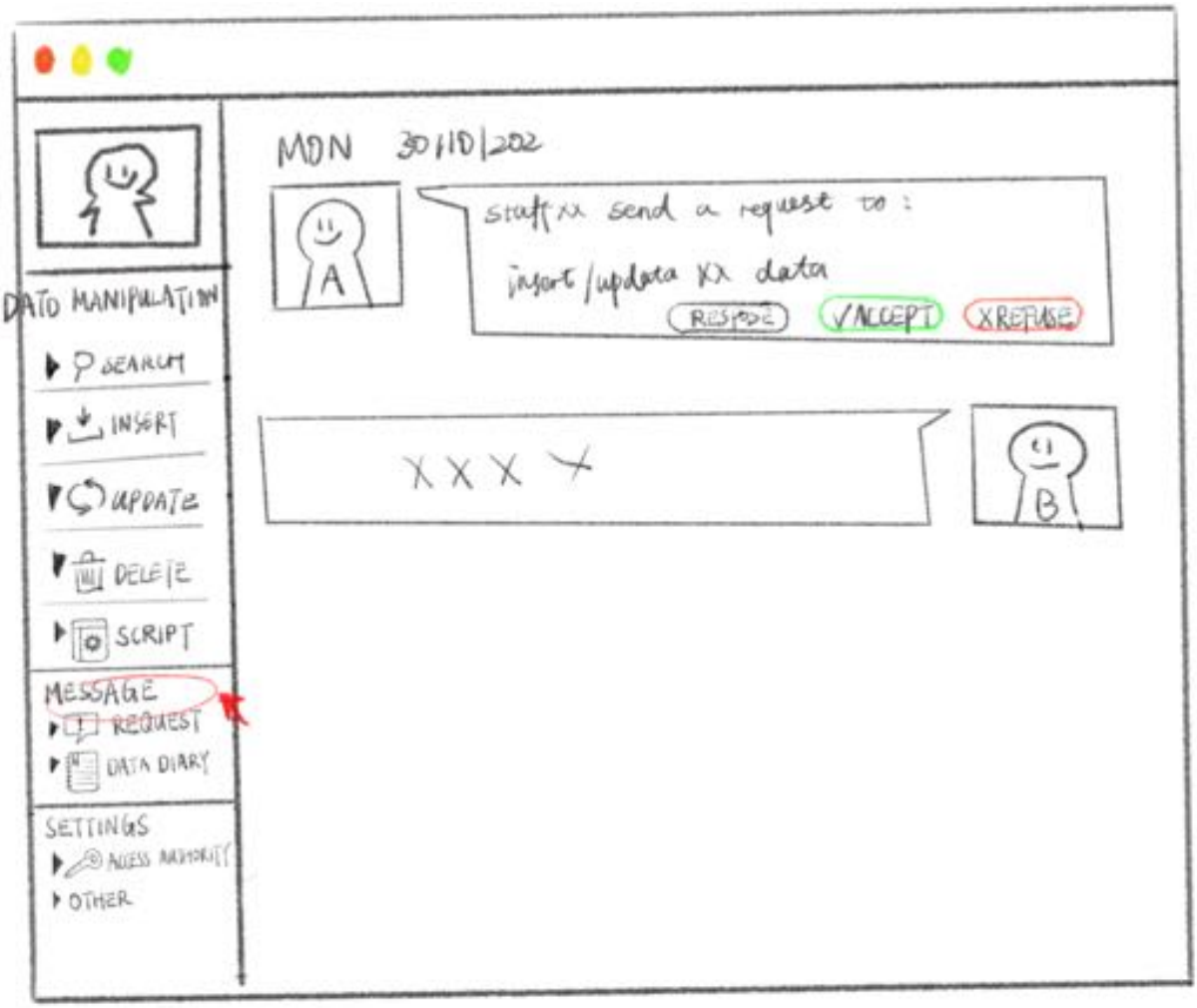
SEEDLINGS NATURE PLANTS COMING FROM

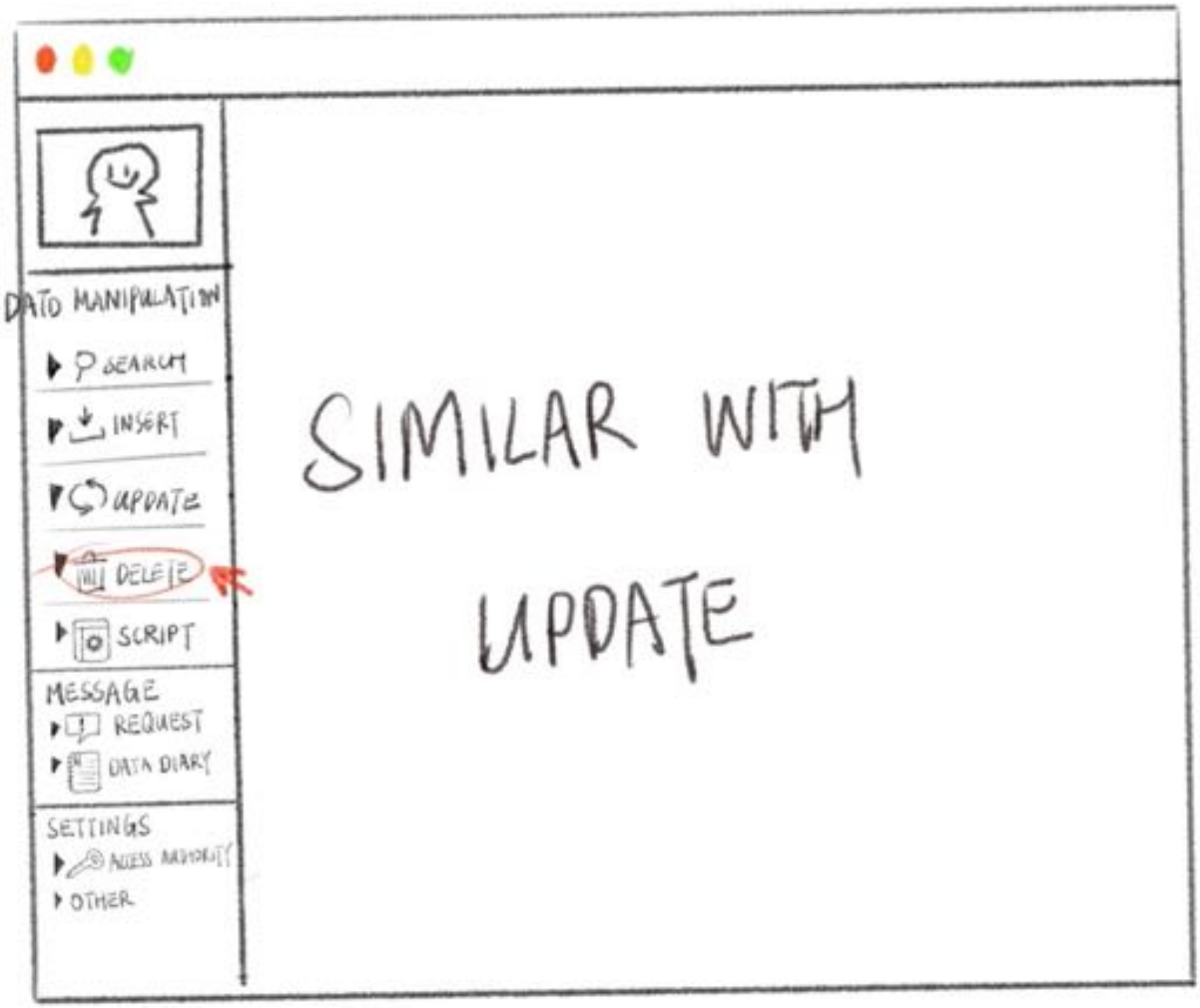
SEEDLINGS NATURE PLANTS COMING FROM

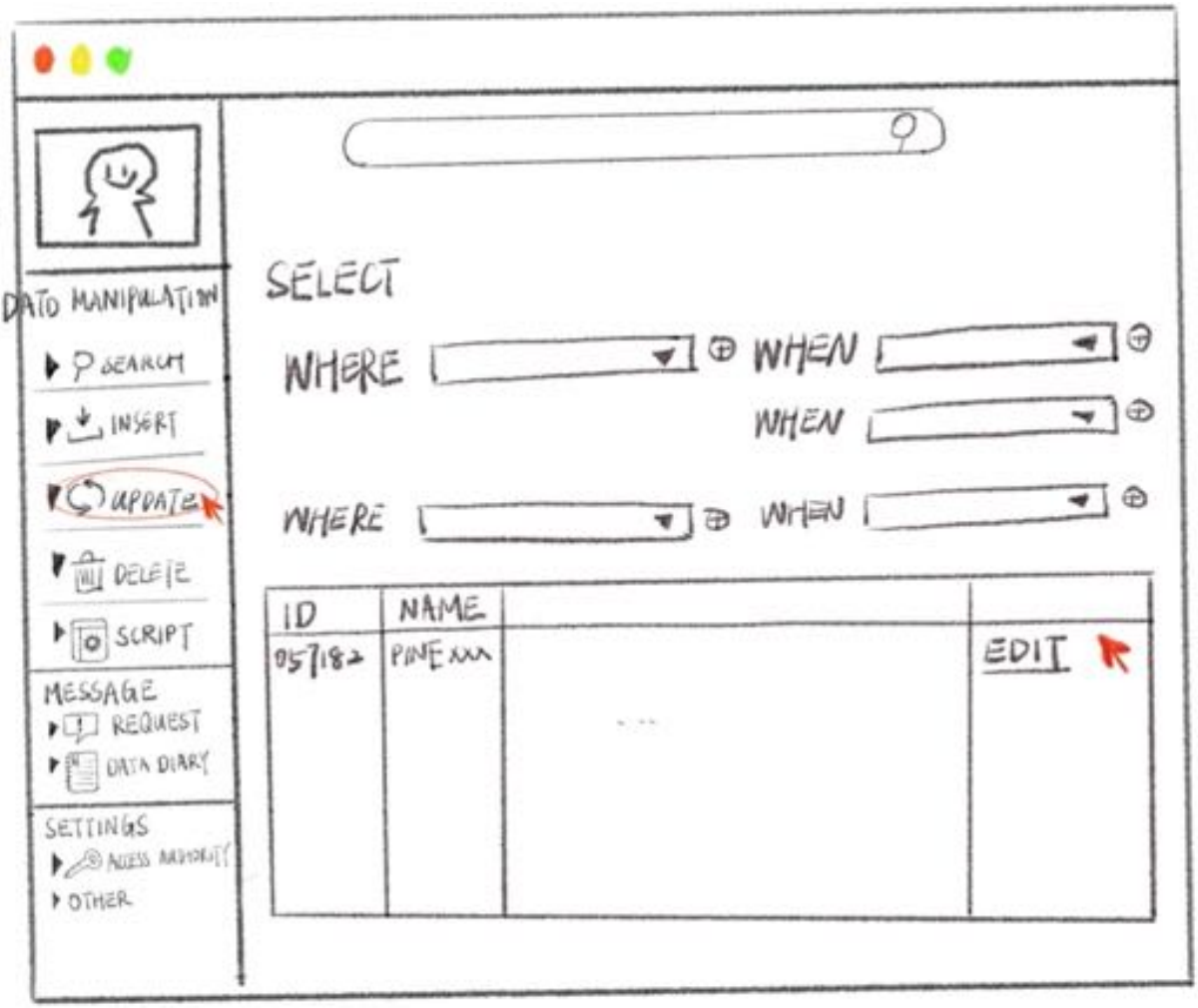
Pie
Tree

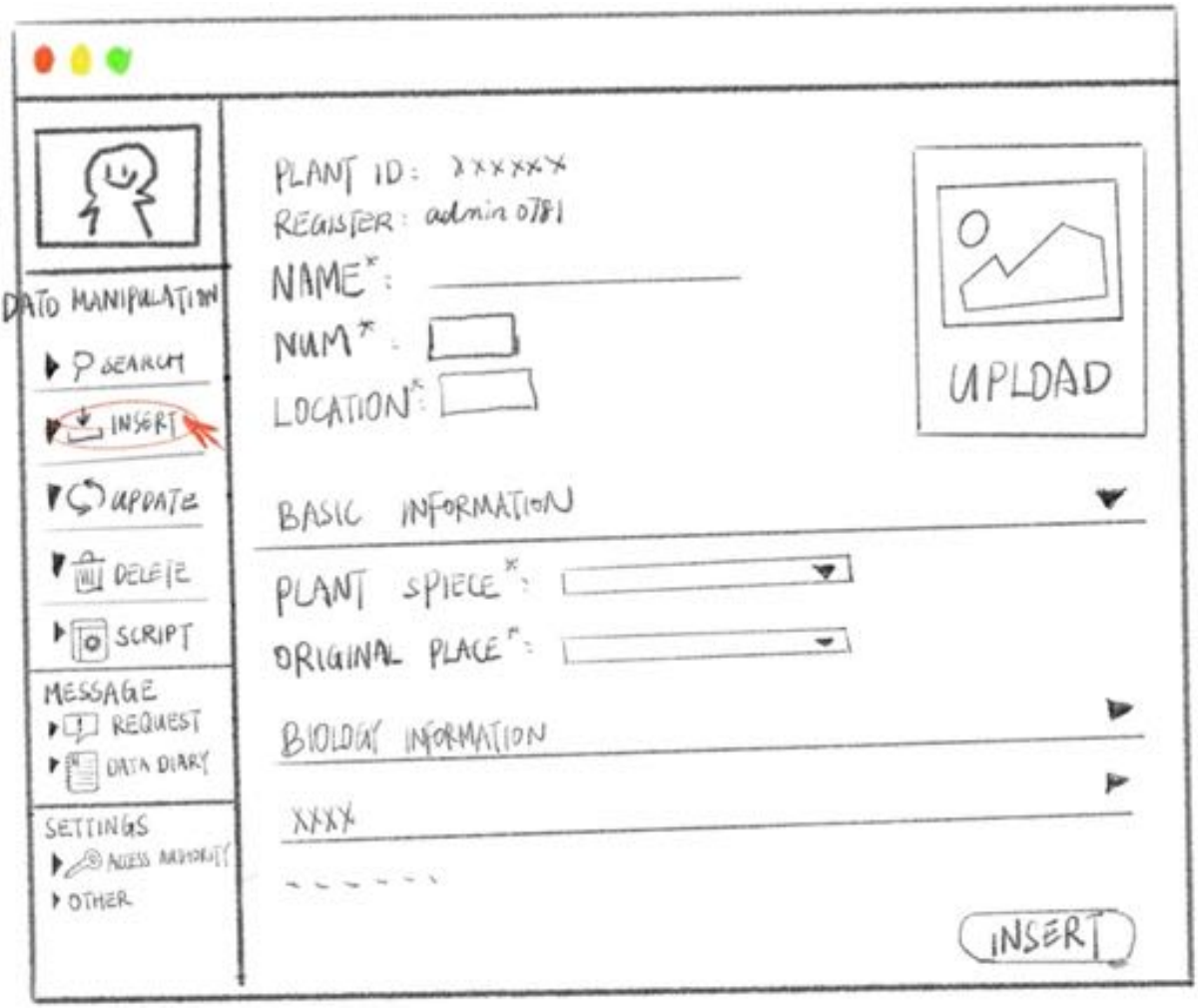

RESEARCHERS: +add -delete ↑update
account
name
ORGANISATION
AUTHORITY
....
DATA MANIPULATION
SEARCH
INSERT
UPDATE
DELETE
SCRIPT
MESSAGE
REQUEST
DATA DIARY
SETTINGS
ACCESS AUTHORITY
OTHER
STAFF : +add -delete ↑ update

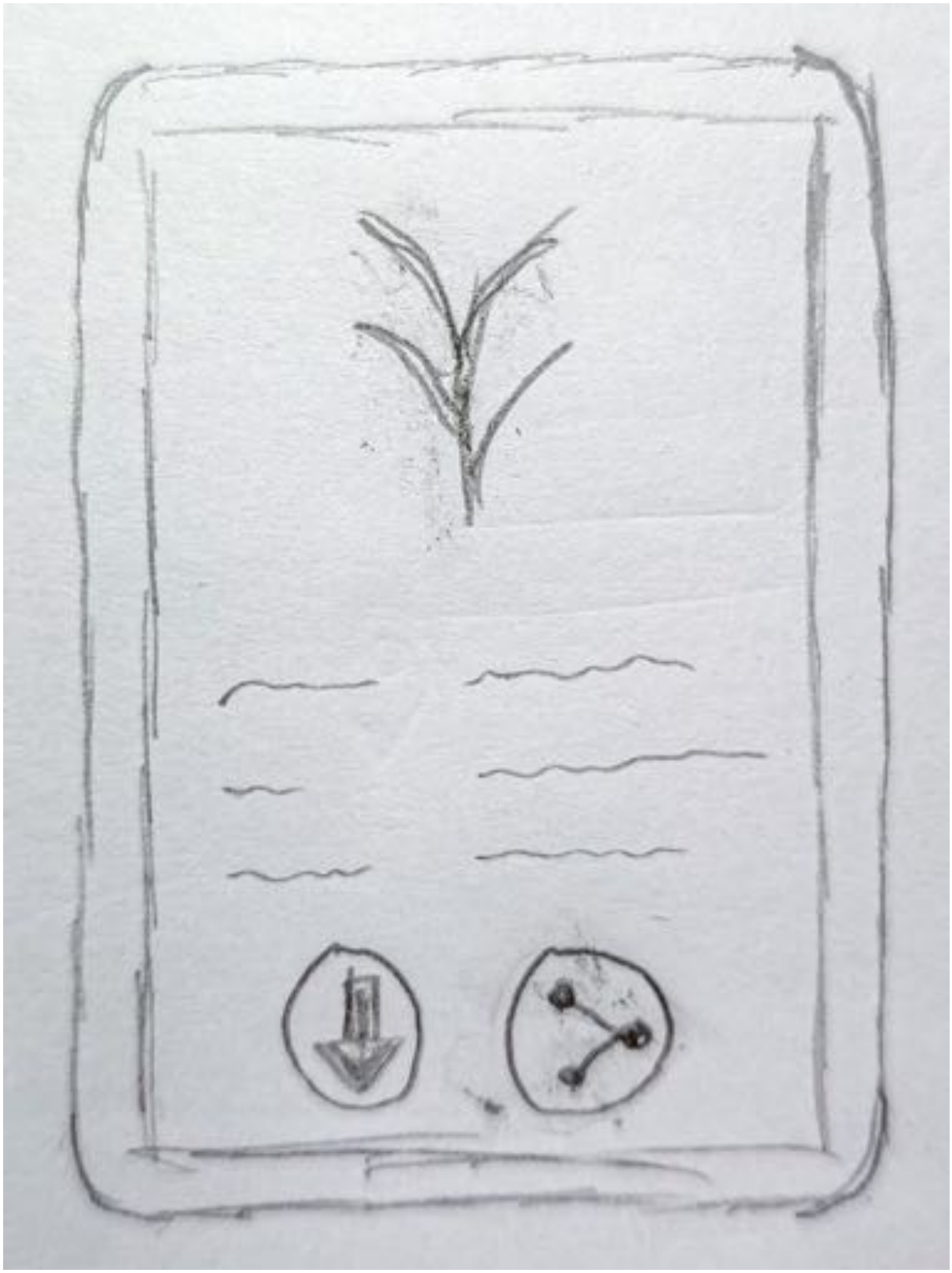
DATA MANIPULATION HISTORY
TIME
OPERATOR
TYPE
DATA RELATED
DATA MANIPULATION
SEARCH
INSERT
UPDATE
DELETE
SCRIPT
MESSAGE
REQUEST
DATA DIARY
SETTINGS
ACCESS AUTHORITY
OTHER
DATA VISUALISATION
JINGWIN'S SKETCH

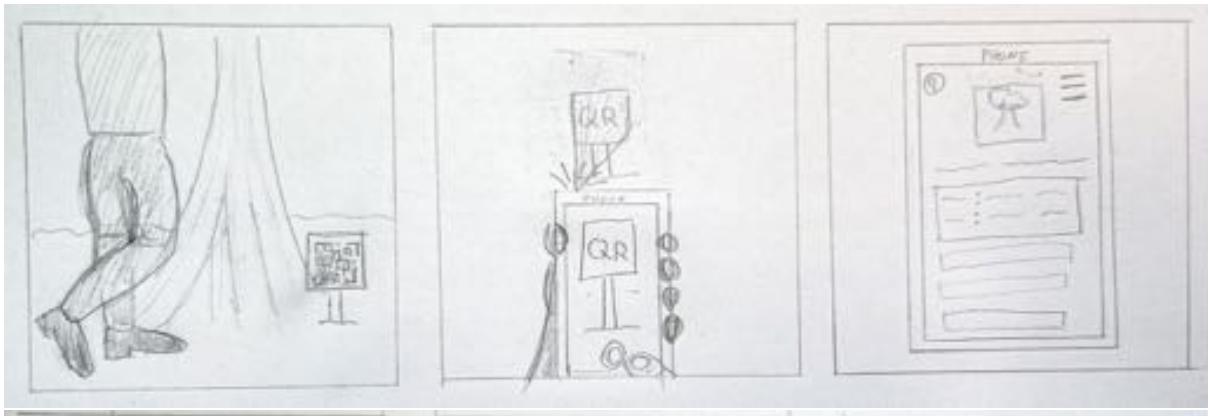

MON 30/10/202
A
staff xx send a request to :
insert/update xx data
RESPONSE
✓ACCEPT
XREFUSE
XXX
B
DATA MANIPULATION
SEARCH
INSERT
UPDATE
DELETE
SCRIPT
MESSAGE
REQUEST
DATA DIARY
SETTINGS
ACCESS AUTHORITY
OTHER


DATA MANIPULATION
SEARCH
INSERT
UPDATE
DELETE
SCRIPT
MESSAGE
REQUEST
DATA DIARY
SETTINGS
ACCESS AUTHORITY
OTHER
SIMILAR WITH
UPDATE

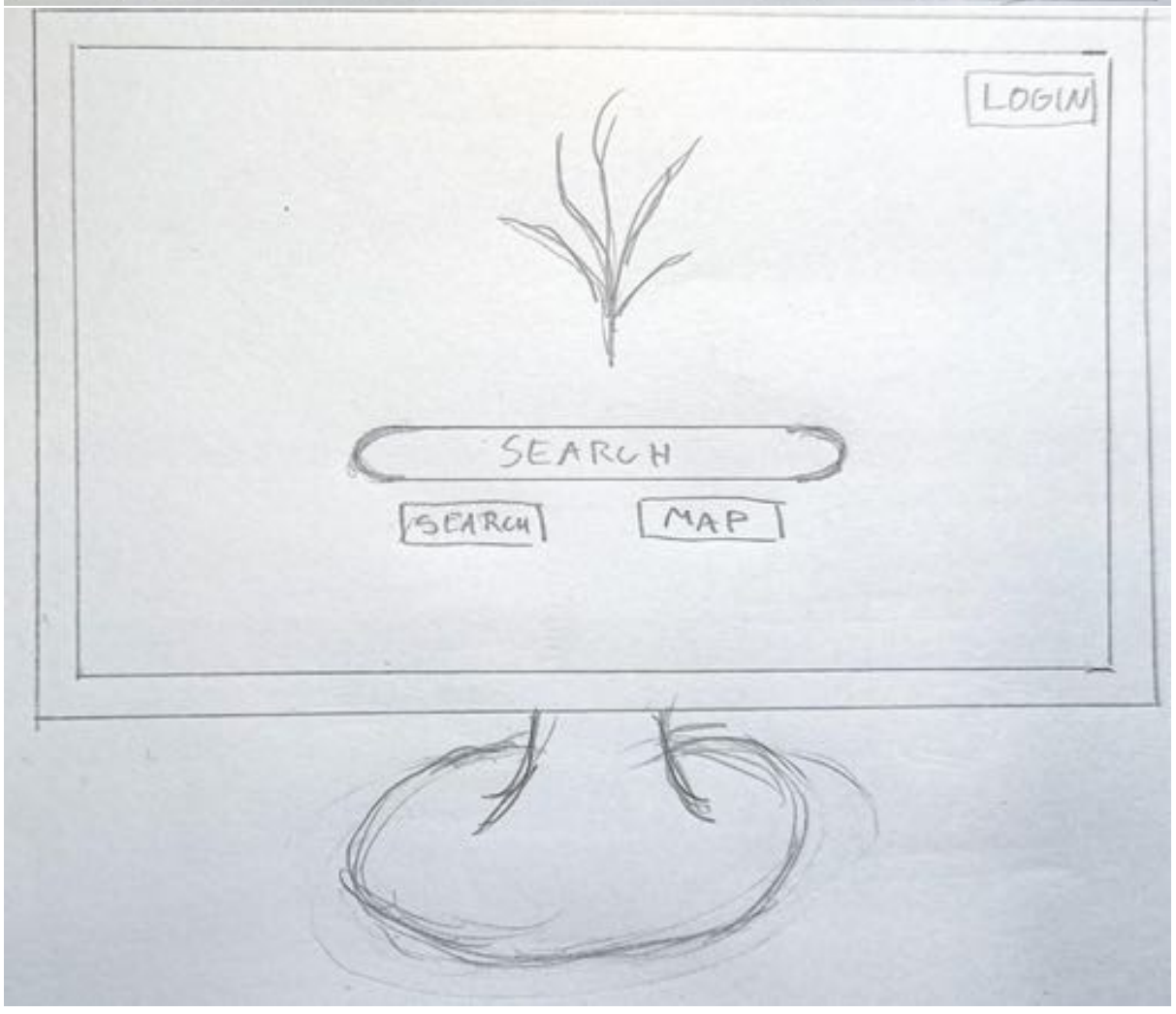

DATA MANIPULATION
SEARCH
INSERT
UPDATE
DELETE
SCRIPT
MESSAGE
REQUEST
DATA DIARY
SETTINGS
ACCESS AUTHORITY
OTHER
SELECT
WHERE
WHEN
WHEN
WHERE
WHEN
ID
NAME
EDIT
05718
PINE xxx

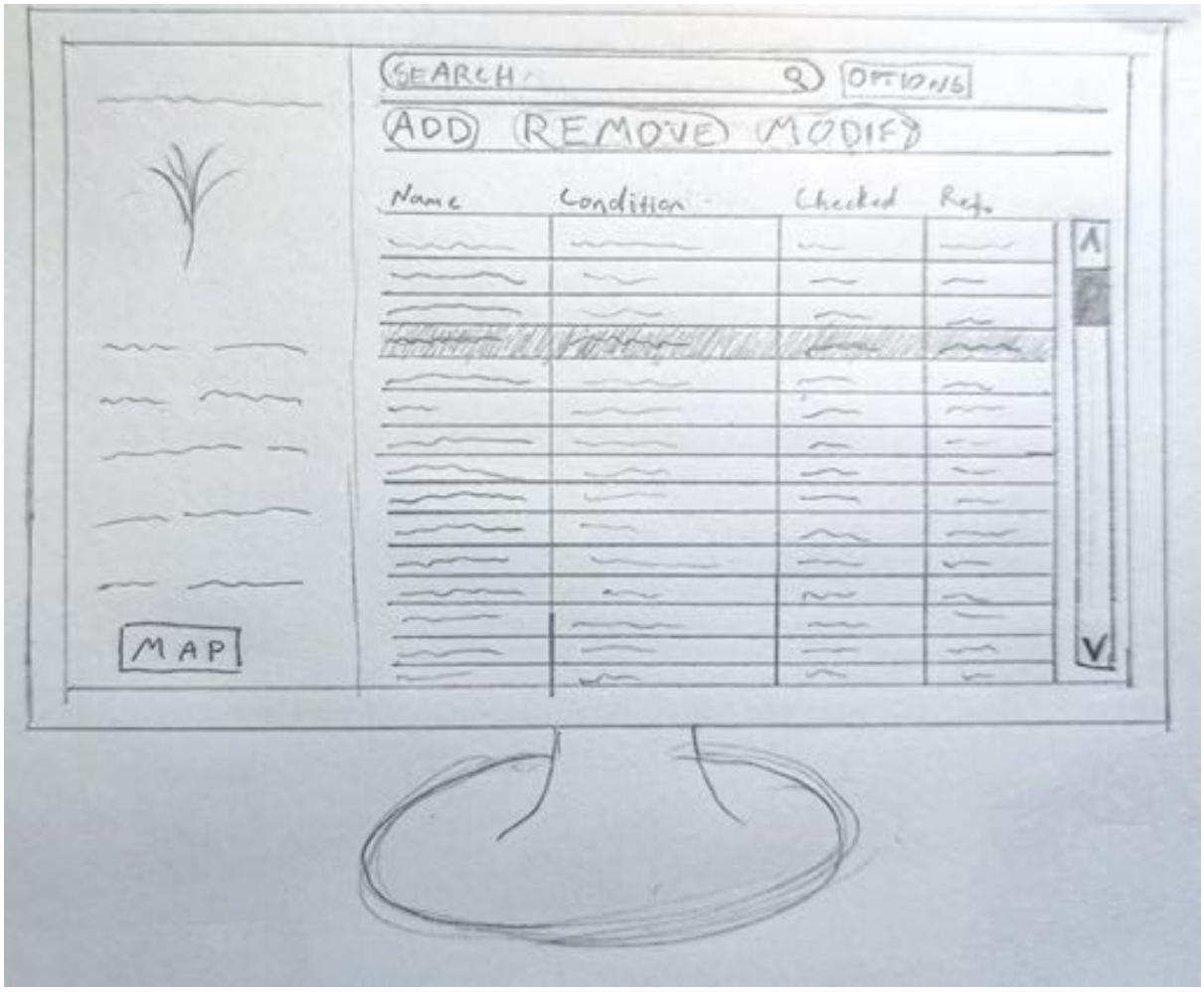

DATA MANIPULATION
SEARCH
INSERT
UPDATE
DELETE
SCRIPT
MESSAGE
REQUEST
DATA DIARY
SETTINGS
ACCESS AUTHORITY
OTHER
PLANT ID: XXXXXX
REGISTER: admin 0781
NAME*:
NUM*:
LOCATION*:
UPLOAD
BASIC INFORMATION
PLANT SPIECE*:
ORIGINAL PLACE*:
BIOLOGY INFORMATION
XXXX
INSERT



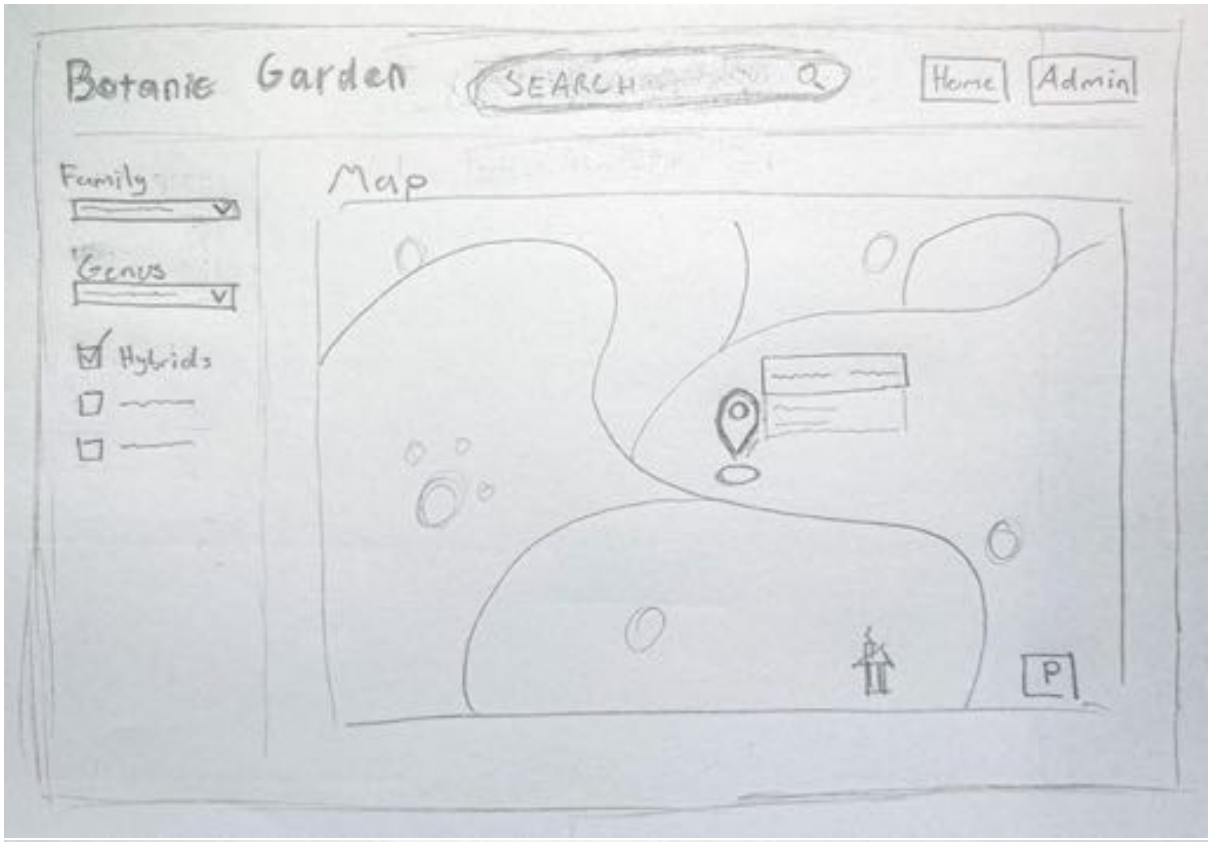

QR
QR

DATABASE
LOGIN
+ addEntry
+ removeEntry
+ searchByID
+ findOnMap

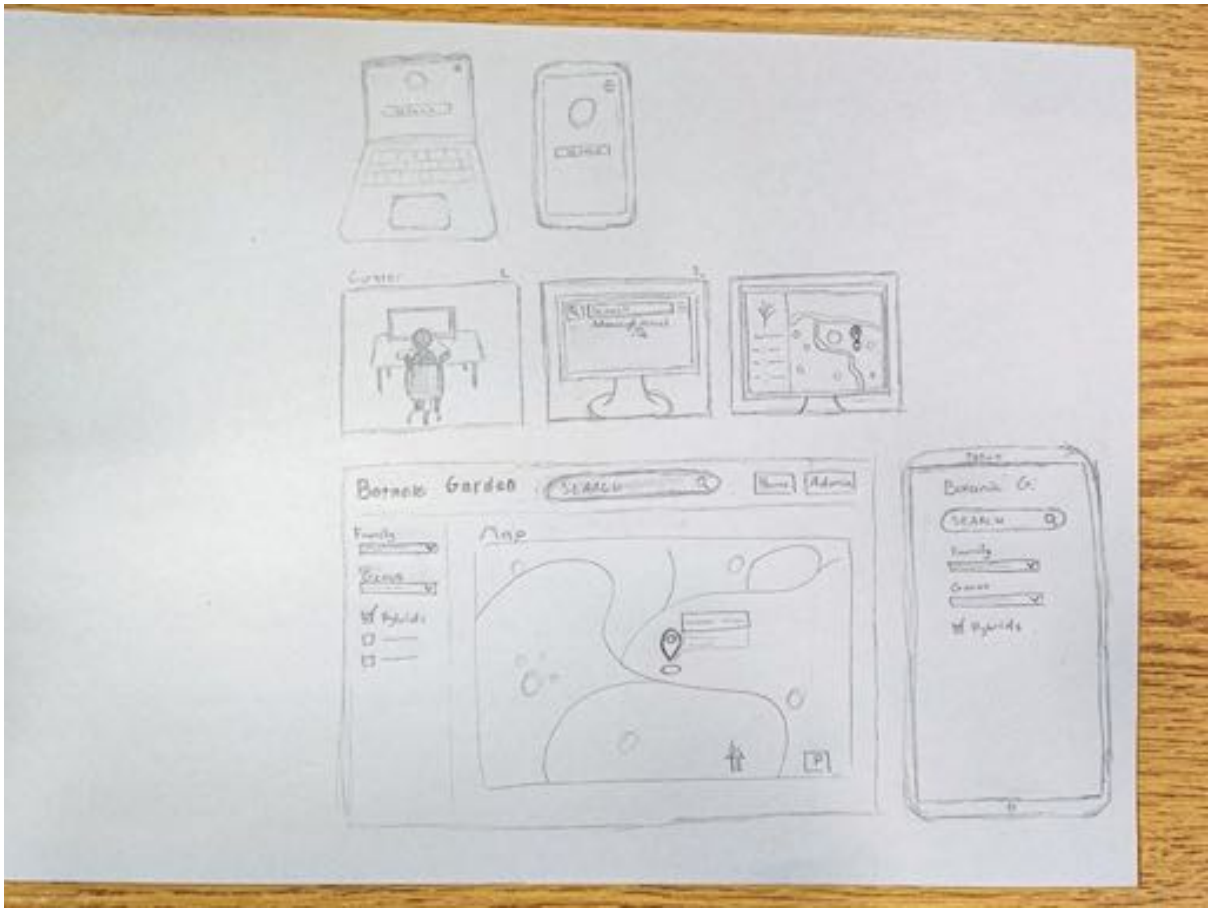

LOGIN
SEARCH
SEARCH
MAP


SEARCH
OPTIONS
ADD
REMOVE
MODIFY
Name
Condition
Checked
Ref.
MAP

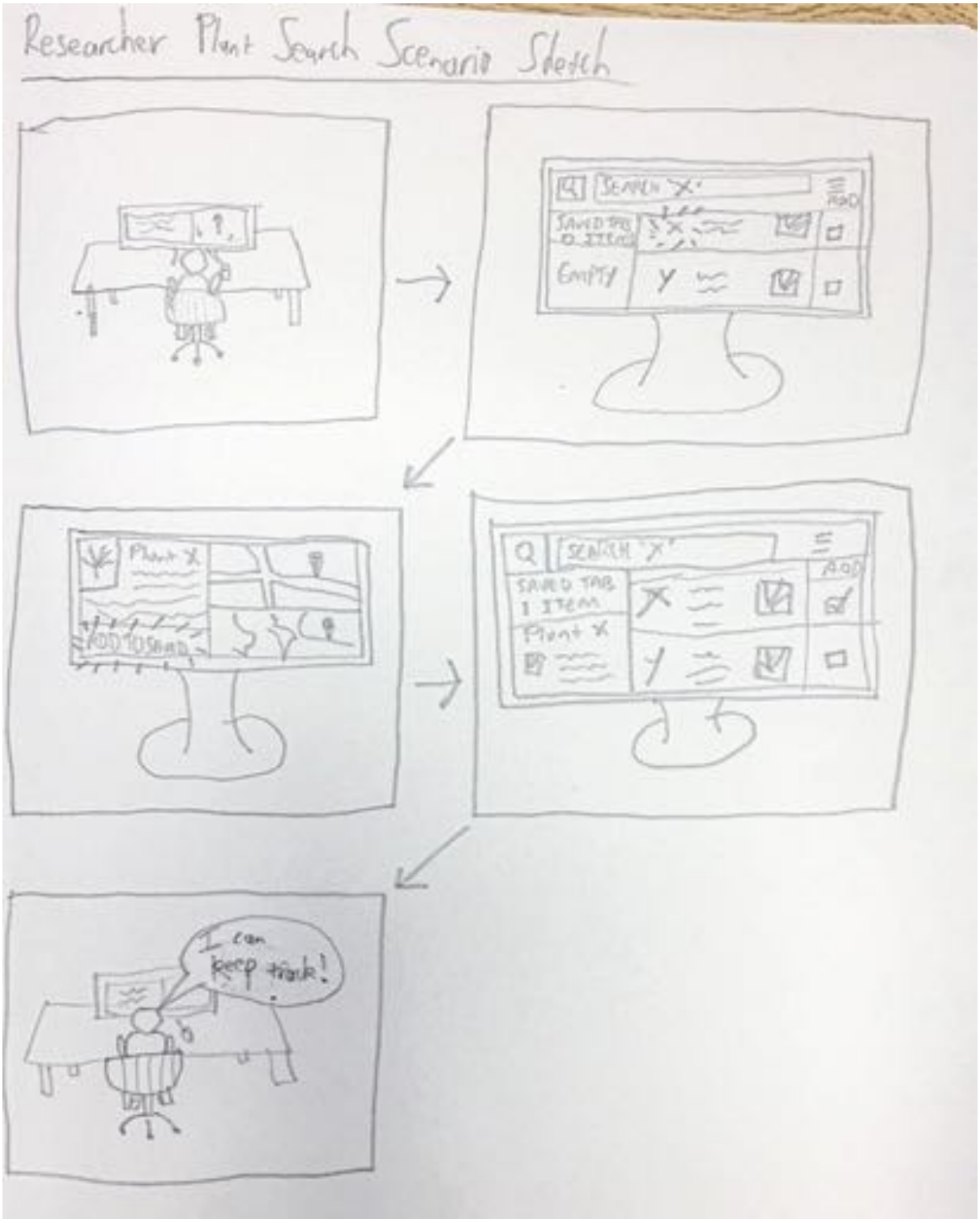
PHONE
Botanic G.
SEARCH
Family
Genus
Hybrids
6

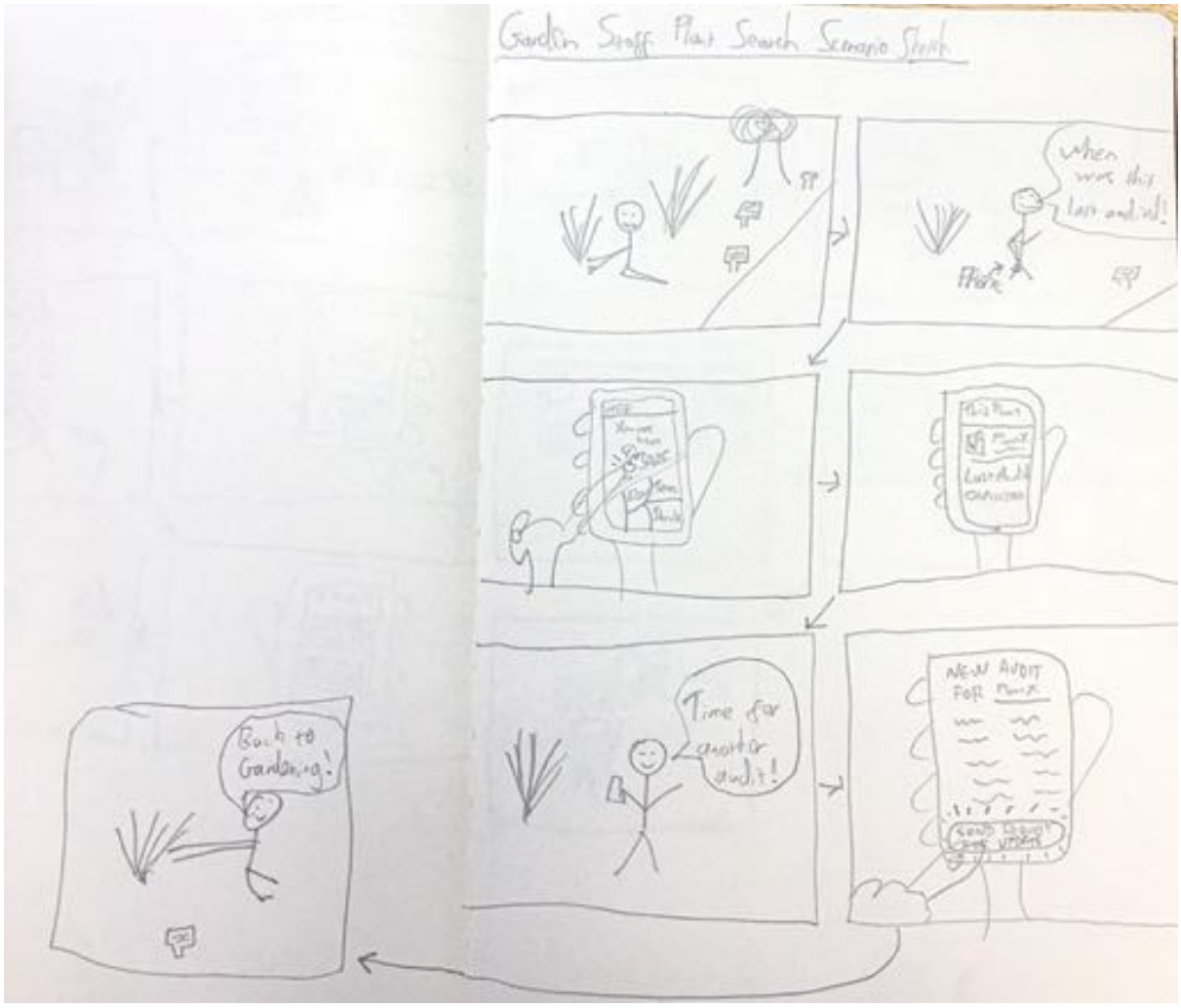

Botanic Garden
SEARCH
Home
Admin
Family
Genus
Hybrids
Map
P

Curator
1.
2.
SEARCH

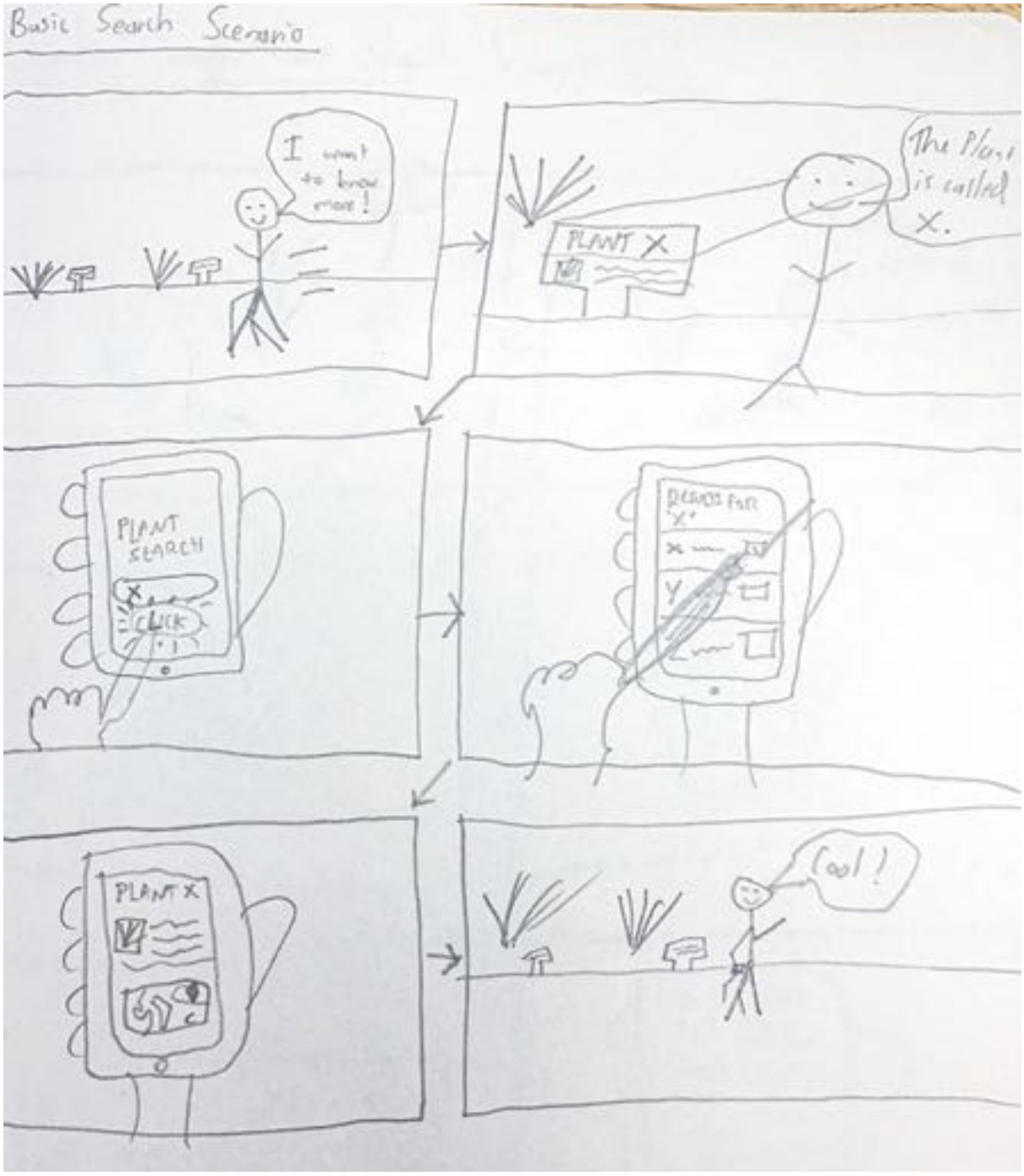

Botanic Garden
SEARCH
Map

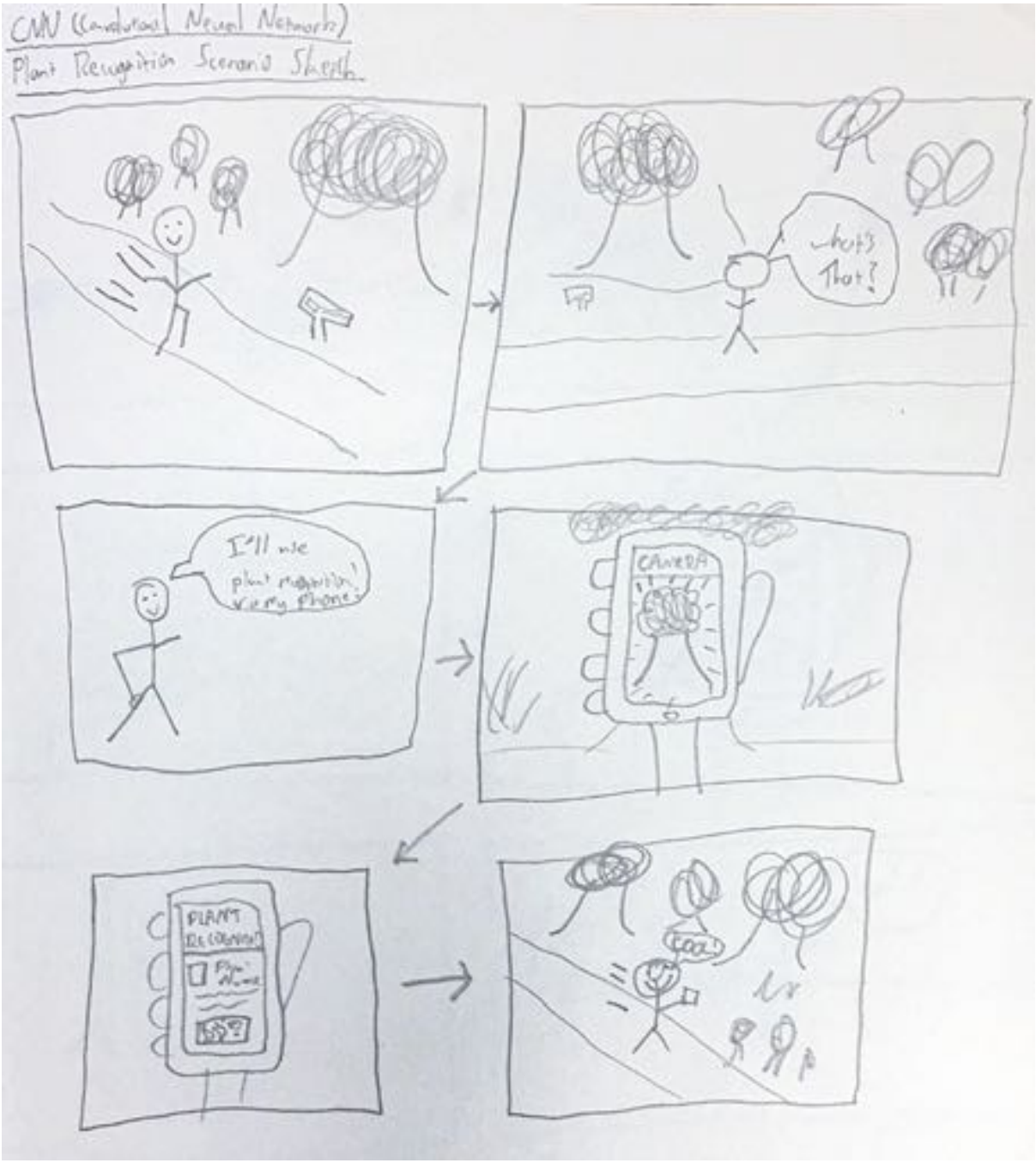
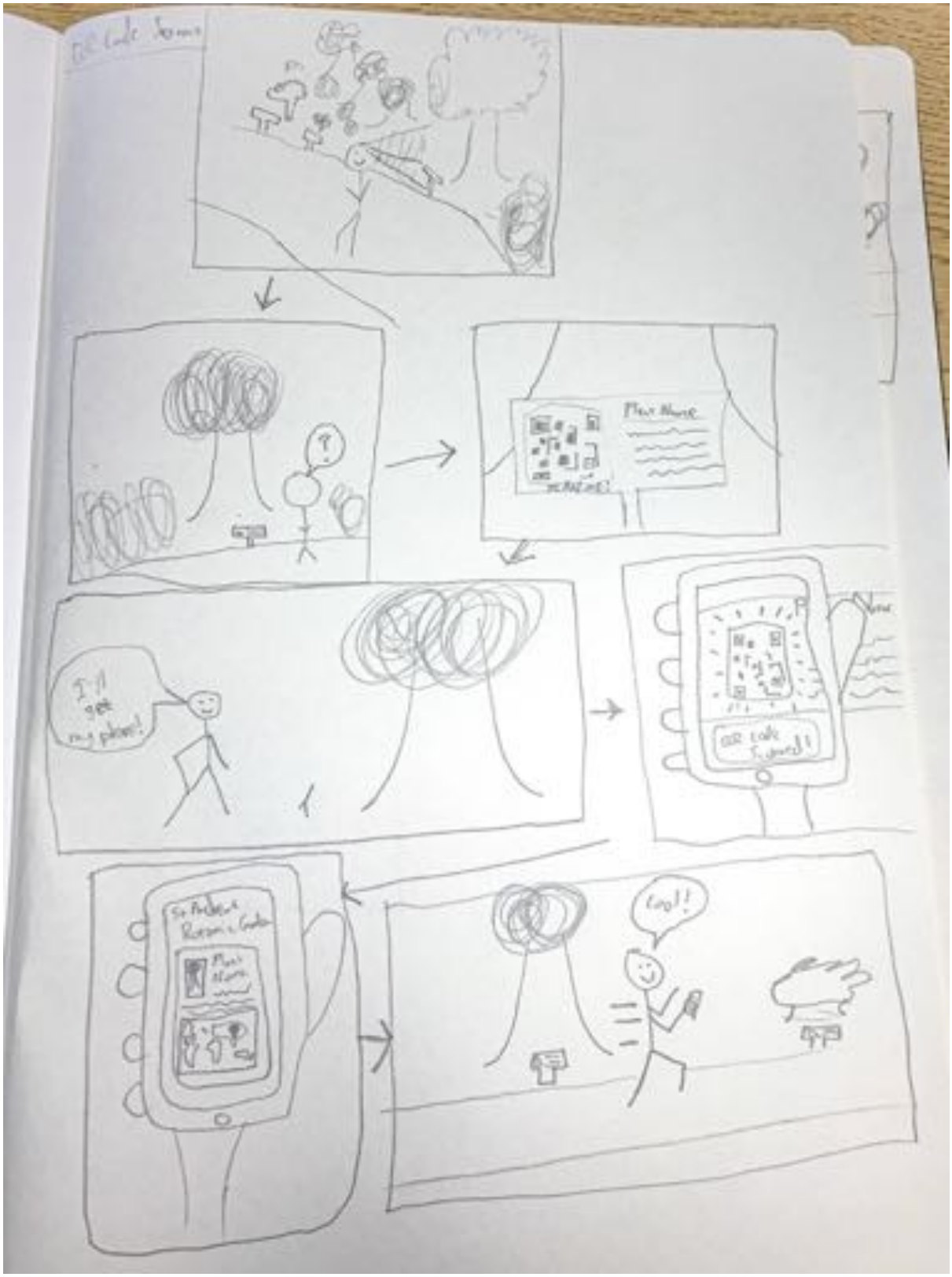
Researcher Plant Search Scenario Sketch




Garden Staff Plant Search Scenario Sketch
When was this last audited!
Time for quarterly audit!
NEW AUDIT FOR Plant X
Back to Gardening!

Basic Search Scenario



CNN (Convolutional Neural Network)

Plant Recognition Scenario Sketch