St Andrews Botanic Gardens Database UX Design – Design and Prototyping

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Introduction and Conceptual Statement

For the final leg of the Botanic Garden Web Portal project, the team set out to design and prototype the portal and its functionalities. This final stretch of the journey draws on all the previous work done, starting from the data elicitation process, going through analysis and ideation, and ending up at designing and prototyping based on the sketches made for practical number two. In this report, we will essentially present and justify the final iteration and product of our efforts.

Conceptual Statement

As per the client's project outline and the general client interviews and data elicitation process, the team was to design a new web portal for the Botanic Garden's database. This project involves both providing significantly improved capabilities to work with the existing data and contributing to the Garden's goal of making its scientific work "more accessible to staff, students, visiting researchers, and project partners around the world" (see client's brief project outline). Aims and objectives of the project, as laid out by the client, include "developing skills in research, curation and interpretation to new audiences". Furthermore, the web portal is to provide a platform to interact with the database without prior programming or software-specific knowledge, and as such, is to include

capabilities for displaying data in both tabulated and mapped form. Finally, the concept requires the team to design the portal regarding appearance and functionality, with a focus on the user.

Goal Statement

As per the assignment brief, our ultimate goals for the web portal are based on the scope that the team situated the project in for the second report, as well as information drawn from our interaction with the client throughout the semester. The overarching goals are therefore closely connected to the aforementioned conceptual statement as well.

The first goal of the project is to deliver a Web Portal for the client's database-under-development that provides a range of functionalities and approachability to the three main user groups identified through the data elicitation process. These user groups are Managers, General Staff, and Outsiders. In analysing the gathered information, the team derived User Work Roles, a Flow Model, and User Personas that mapped how different users would come to interact with the portal. This was immensely beneficial for the purpose of understanding differing needs between user groups. For example, we understood that user groups are distinctly unique in the way they interact with the web portal. As mentioned in the concept statement, the project was to have a heavy focus on the user, which is why the team ensured to follow this thread throughout the project, culminating in the proposed designs. Therefore, a sub-goal to the first goal is to ensure the usability of the portal for any user, regardless of use case.

A second overarching goal was to ensure efficient traversing of the vast database that the web portal is designed for. This goal is crucial in the light of the knowledge gathered form the data elicitation process. At the highest level, a curator needs to be able to reliably access the 18 000+ entries in the database, modify them, and more. At the other end of the spectrum however, a general visitor needs to be able to similarly access the web portal, but not be overwhelmed or deterred by the amount of data or complexity. We obtained this knowledge via questionnaire responses from garden visitors. The designs proposed therefore aim to cater to the curators in need of more advanced tools when working with the database, and they also aim to provide more accessible and intuitive solutions for visitors and other users alike.

Our third goal is closely related to the previous one. The team wants to design and prototype a web portal with all the required functions, but also introduce novel ideas and more advanced concepts. Through our scoping process, we identified that while our focus is on the portal itself (instead of the underlying database), there is much room for ideation and creative solutions in the space of our scope. Having analysed the information gathered and having concluded that our project will likely include most of the aspects the client wished for, we also had a plethora of ideas that situated themselves outside of the client's requirement but contributed handsomely to the overall quality of the web portal.

The next section will dive deep into these goals of the team, introducing our designs and prototypes. Different levels of fidelity have been used between the prototypes depending on the emphasis of the design. Regrettably, the team could have done with an infinite amount of time in design the product, but like with any
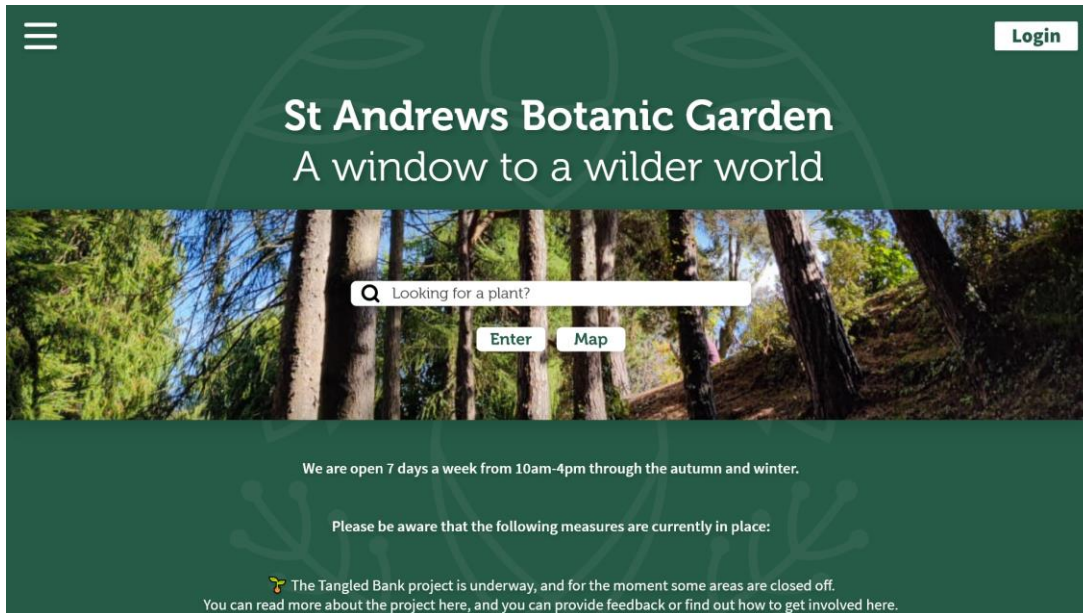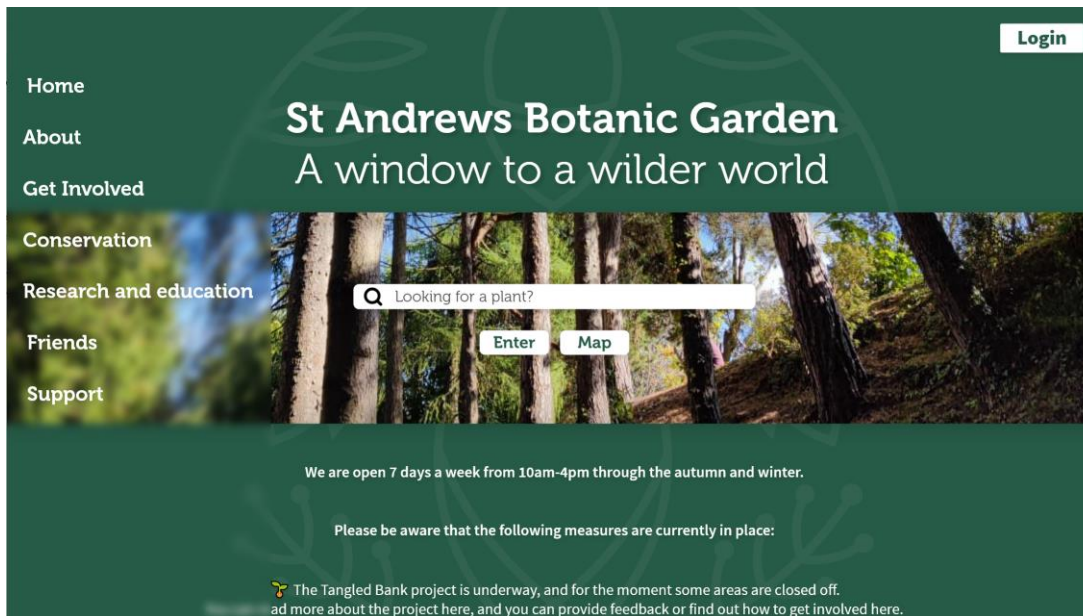
Figure 1.

Figure 2.

project, it is optimal to narrow the focus onto designing crucial parts of the project well, in an attempt to avoid the so-called headless chicken syndrome. We have therefore made sure to focus on what we believe are the most essential parts of the portal and prototyped with specific functionalities and designs in mind, rather than making every prototype a complete showcase of everything involved. In doing so, the proposed web portal is the combination of each prototype and design made and presented here.

Illustrated Design Proposal and Prototypes

At its core, the Web Portal is a collection of specialised interfaces and functionalities all wrapped into one coherent entity. For the purpose of presenting the client with the final proposed designs for the Web Portal, the team has boiled down the project to its most important elements and engaged in prototyping these with different levels of fidelity based on need. For example, for interfaces where the visual experience is of key, the prototype has been made in higher fidelity to efficiently convey the solution and overall feeling of the web portal. Purely functional aspects, on the other hand, have often been prototyped in grayscale to direct the client's focus towards functions instead of the UI design. This comes as functionalities do not necessarily hinge on visuals to be effectively communicated and visuals can at worst hinder the message being efficiently conveyed.

Landing Page

The first prototype made by the group concerns the Web Portal's landing page. As seen in Figure 1. and Figure 2., a simple page was designed for the use of visitors and staff alike. The design came about by utilising the fonts and colour schemes of the Garden's
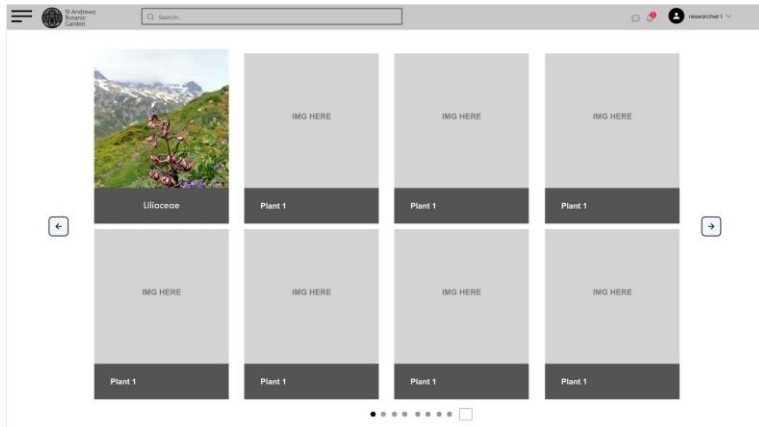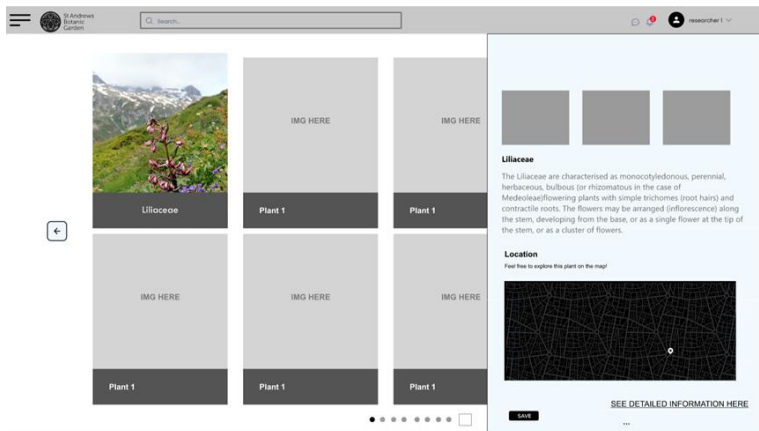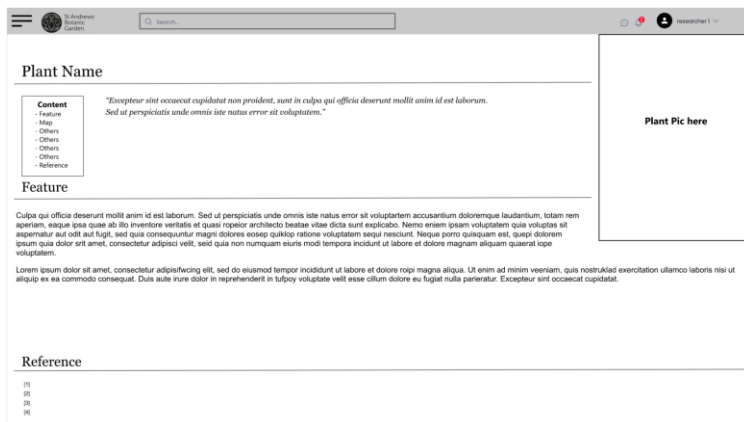
Figure 3.

Figure 4.

Figure 5.

visual identity, provided by the client. Additionally, the design draws heavily on the mood board created for Practical 2. The prototype is made in high fidelity, with an interactive sidebar and a scrollable design. This is to show the intended colour scheme, style of design, and overall implementation of the design. As such, it serves as a good introduction to the coming prototypes that are more technical and functionality-centred in nature. The content is, however, from the original website, as the emphasis was not put in this area. The idea was rather to showcase the existing website in a new light. Finally, and arguably most importantly, the site includes a login button for admins to enter the data management section of the portal. The landing page can thus be used in two ways. Firstly, it serves as a central hub for all users, with a search bar to access plant data. Secondly, the page serves as the window to more advanced features for staff and admins by logging in. Both use cases were deemed to be at the core of the web portal's identity after the analysis of our data elicitation process.

Visitor Data View
When a user searches for a particular plant on the web portal without having logged in, the results page in Figure 3. is reached. Utilising a high-fidelity prototype, the page is designed to show an accessible and intuitive mode of browsing search results. The level of fidelity can show the envisioned look of the page, while still keeping focus on the functionality. Furthermore, the prototyped look of the page is in line with the information derived from the analysis of the elicited data, where it became apparent that visitors and lower-level users need simple but usable interfaces. This contrasts with the more specialised administrator pages of the next section. Clicking on a plant card on the
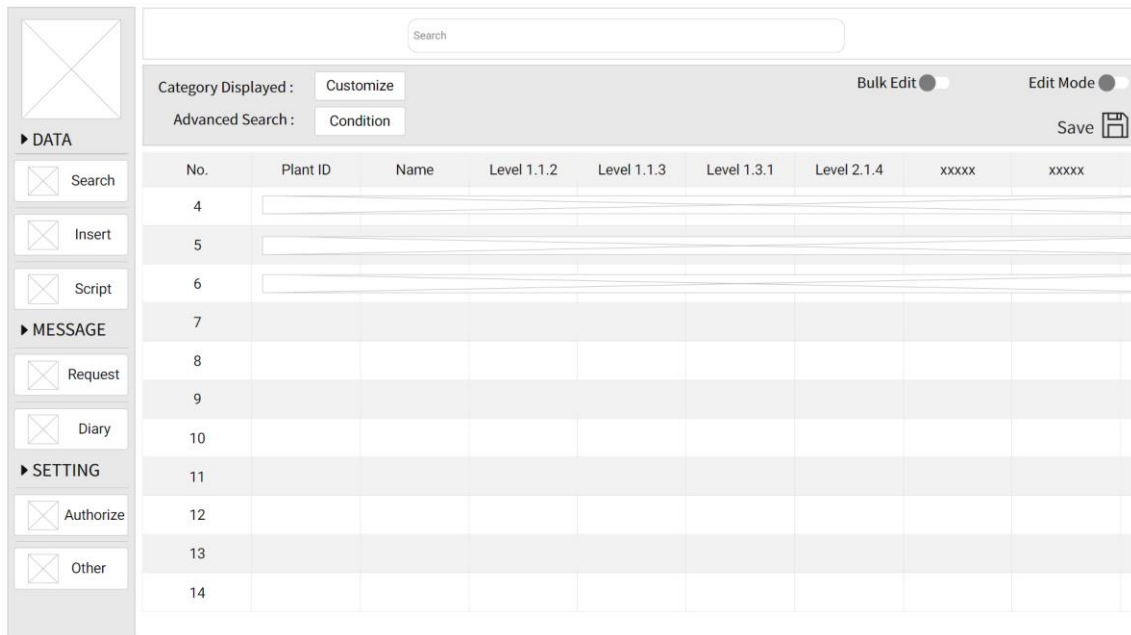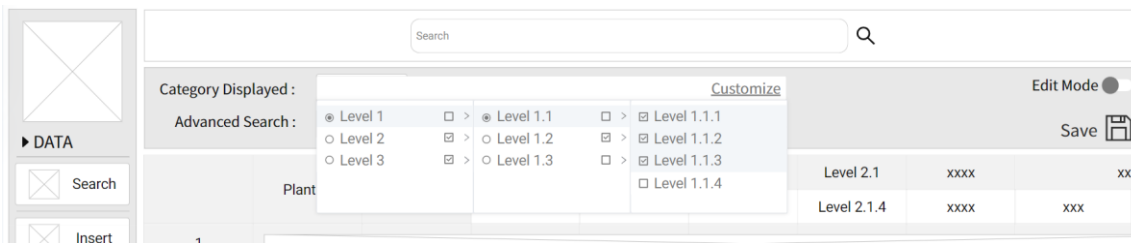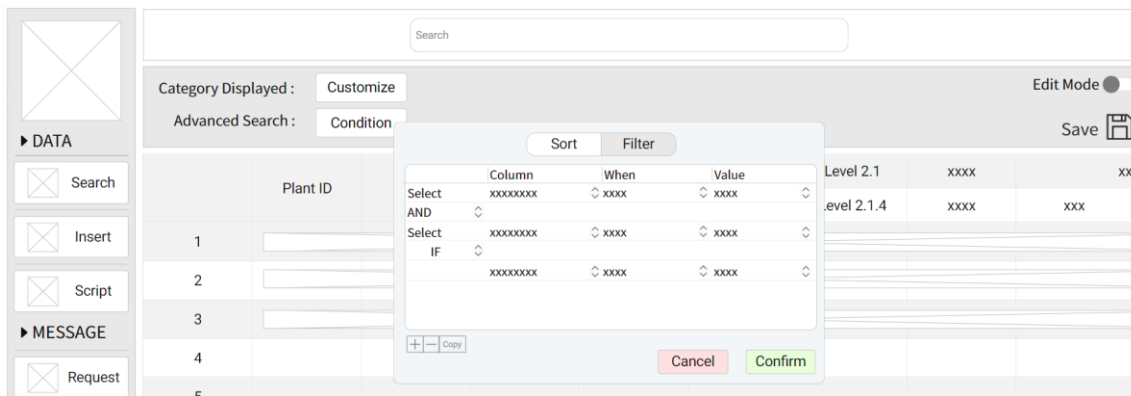
Figure 6.

Figure 7.

Figure 8.

results page reveals a pop-up showing more information on the plant, a location box with a link to the mapping feature to-be-discussed, and a further link to a more detailed page (Figure 4.). This separate page with more information for the plant is envisioned in Figure 5. The visitors' results page is designed with ease of use in mind, while still maintaining a range of capabilities and interactivity. It is also adaptable to work in mobile form, which we cover in a later section.

Administrator Page

Once a user has logged onto the portal, they have access to the so-called admin page. Here, different users have different levels of access, but for the purpose of this assignment we have prototyped with the full-access director or curator in mind. The administrator pages and their features are essentially a collection of the most important features we derived from our analysis. Furthermore, the administrator page has notably been designed as high-fidelity grayscale wireframes to represent intentions and functionalities rather than colours or detailed visuals. Figure 6. depicts the general layout and look of the page. On the left-hand side are different pages within the administrator portal with functionalities such as inserting, searching, and requesting. A particularly interesting feature is the diary button, which accesses a page of the history of changes made across the system. This feature came about when exploring how to keep track of all the small but possibly impactful changes that are made in the portal on a daily basis. The notion is that the feature would relieve the users' cognitive load and thus aid the overall workflow. On the top are buttons allowing to change the settings with which data is displayed in the field below them. Figures 7. and 8. depict these more advanced filtering options. The top section also has a
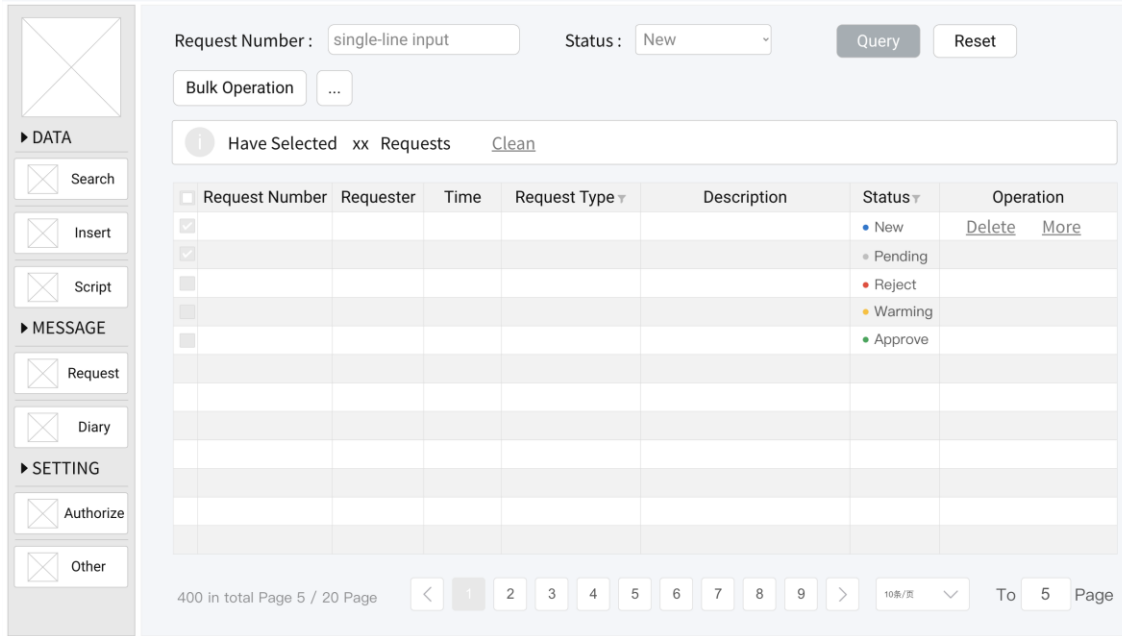
Figure 9.

Figure 10.

search bar and toggles that access an editing mode of the data, rather than purely viewing it. The save button on the right-hand side allows the user to save any selected entry into a saved tab for later use (seen in Figure 9). This saved tab acts a sort of short-term memory and enhances the ease of use. This idea primarily arose when we considered the scenario of a remote researcher searching for multiple plants. If that researcher manually kept track of all plants that they found interesting, it could produce unnecessary cognitive load. So, we decided to add this saved tab feature to help relive this unnecessary cognitive load for any user. As an example of one of the functionalities in the sidebar, Figure 10. represents the Insert page. Here, the user can input all relevant information for the plant, add a picture, import the data from an external file with the *Import Data* button, and much more. Figure 11, on the other hand, shows more advanced feature, allowing the administrator to manage requests by other staff members to update data concerning a specific plant. Perhaps a gardener has been working with a plant and noticed it needs some tending to, and thus submitted an auditing request. While not prototyped due to time constraint reasons in this current design iteration, each of the other pages would follow a similar model. The administrator pages can thus be described as a mix of more basic and more advanced functionalities, all depicted in the same space. A final example of a more advanced idea is the Script option, which allows a user to load in R or Python scripts to process the data in a predetermined and automated way. This integration is naturally aimed at high-level users, but it bridges the gap between straightforward functionality and powerful functionality that was communicated from curator questionnaire responses during data elicitation.

	Request Number :	single-line input		Status :	New		Query	Reset

Bulk Operation ...

ⓘ Have Selected xx Requests   Clean

☐	Request Number	Requester	Time	Request Type ▽	Description	Status ▽	Operation
☑						● New	Delete More
☑						● Pending	
☐						● Reject	
☐						● Warming	
☐						● Approve	

400 in total Page 5 / 20 Page   ‹ 1 2 3 4 5 6 7 8 9 ›   10条/页 ∨   To 5 Page

Figure 11.

▸ DATA
☒ Search
☒ Insert
☒ Script
▸ MESSAGE
☒ Request
☒ Diary
▸ SETTING
☒ Authorize
☒ Other

The Interactive Map

A major wish from the client was that the web portal would include a mapping functionality through which plants could be located, viewed, and interacted with. In addition, the map would also double as a way of navigating around and exploring the garden. From the data elicitation process and our analysis, the team also noticed that respondents to the questionnaire were positively inclined to use a mapping functionality to traverse the web portal. Approaching the design of the map functionality, the team first considered all the capabilities included in the more general tabulated view of the data. The idea was that plants would not only be locatable on the map, but that one could also work with the data while using the map and hopping between different levels of viewing data seamlessly. The

prototype was again built-in high fidelity, with emphasis on functionality over very specific visual design such as colours. Figure 12. depicts the designed prototype. On the left-hand side, a range of plants on the map are shown as cards, allowing the user to locate it, save it, or acquire more info about it. Pressing the locate button moves the interactive map to the pinned location of the plant and displays an information card for the said plant. From here, the user can again choose what to do next. Pressing the save button allows the user to save the plant to the same memory as displayed in Figure 9, where the aforementioned actions can be taken to further work with the data. Figure 13. depicts how saving a plant prompts a notification as well as updates the saved tab counter in the upper-right corner. These notifications are designed to provide users with confirmation feedback that their actions have indeed altered the system's state, which hopefully eliminates any sources of possible confusion. Clicking on the saved tab button would also take the user to the discussed saved page. It is notable that the saved page is designed to be a feature for both administrative and non-administrative users. Naturally, the user can also browse the map by scrolling and dragging, and possibly clicking on a pin in a specific location to access the information card. The plant cards on the left dynamically update based on the proximity of plants for the current view on the map. Finally, Figure 14. showcases an adaptation of the map feature for mobile users, where similar functionalities are available but now the map can also be updated based on the user's current location. This is seen between the left-hand and right-hand side pictures. This idea was first realised during the project's sketching phase, where the scenario of garden staff members needing quick and easy methods of search during busy shifts
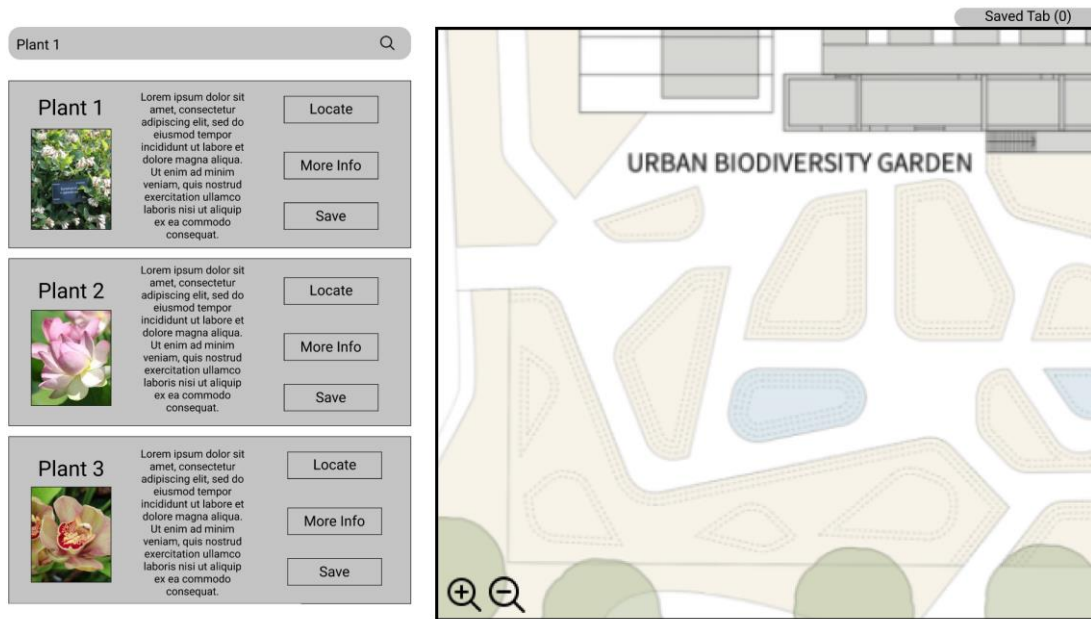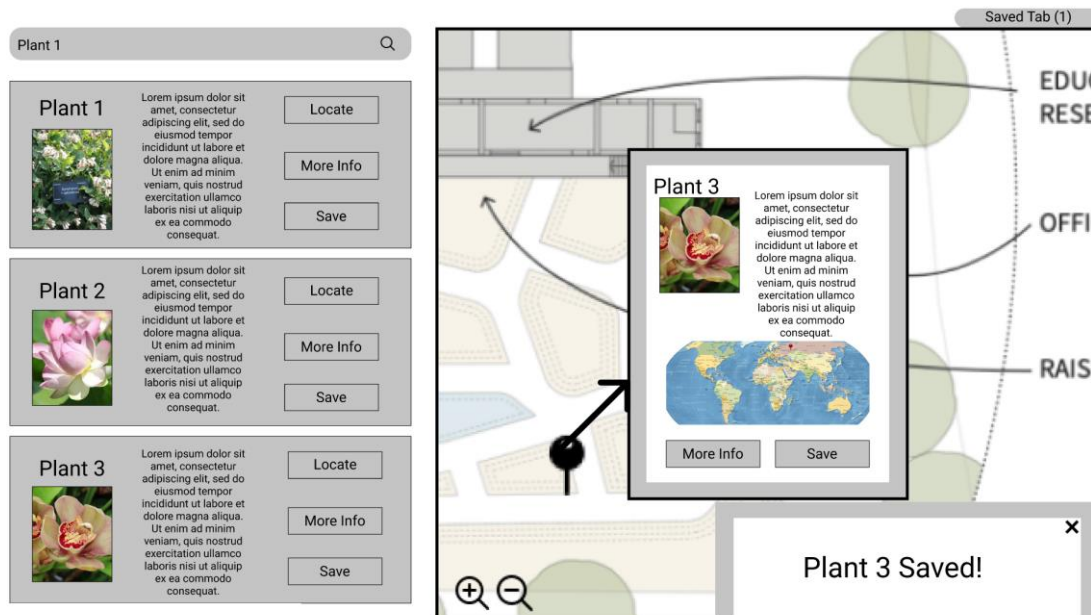
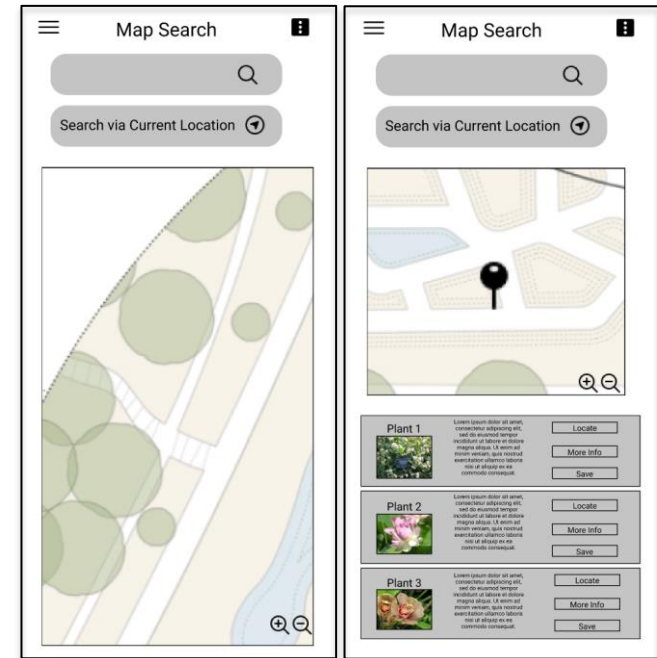**Figure 12.**

Figure 13.

Figure 14.

was sketched. In this scenario, a simple location-based search provides a solution to this problem, as requested by garden staff members who responded to our questionnaire in the data elicitation phase. Overall, the mapping functionality closely follows the needs identified in practicals 1. and 2. and the client's wishes.

Mobile Functionalities
Figure 15. showcases search methods adapted for mobile users of the platform. These are all a part of our advanced features and are not as such a part of our most basic suggestions. They are also prototyped in high fidelity to portray the actual user experience, but frames are still left blank as the emphasis is again more on the functionality than the design. Starting from the left, the first frame shows a simple QR code alternative. The idea for QR codes came from the interviews with the client, where a question that arose was how plants could be searched for if you do not remember a specific name of the plant. Conveniently, using a phone's
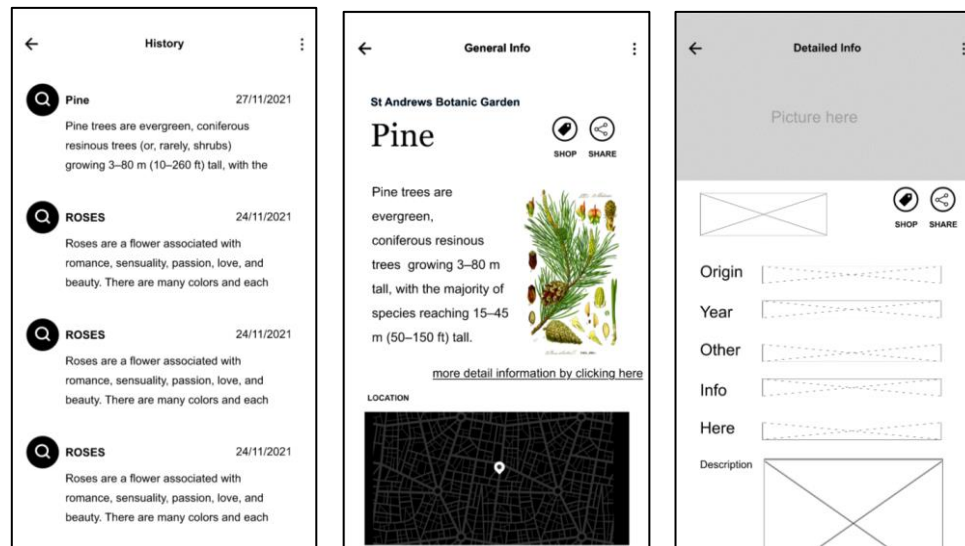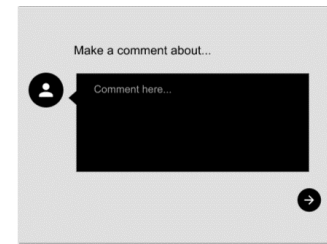
Figure 15.

Figure 16.

Figure 17.

camera like this is also a very fast method of searching and can thus be utilised by all user groups. While common and highly convenient, QR codes nevertheless come with the flaw of having to print out tags for each plant if used. We therefore came up with the idea of using neural networks and image recognition to search the database by simply pointing your phone's camera at a plant. For implementation, Google Lens already makes such a feat possible and could therefore be utilised. This capability is shown in the middle and right parts of Figure 15. Figure 16., on the other hand, shows the user search history with the camera functionality, a results page for a specific plant, and a page for detailed info accessible by clicking the link. The location information right below is a neat feature that utilises the technology to show exactly where the plant is found. Also notable are the shop and share buttons depicted. Via these the user can add the found plant into a shopping cart if they were to want a seedling of said plant or they can share the result across a platform of their choice. The idea of implementing the capability to add the plant to the user's basket came in fact from the client himself during a presentation meeting for our sketches. The shop is already a feature with the existing web page. Figure 17. shows a final functionality for the possibility to comment when interacting with others through the share button. The higher fidelity prototyping really came in handy in the case of Figure 16., as it allowed us to show the more intricate details of our envisioned design.

An Intuitive Search Method
A question the team asked itself during the sketching process was how can we help the general visitor with little to no experience with plants? While the QR code
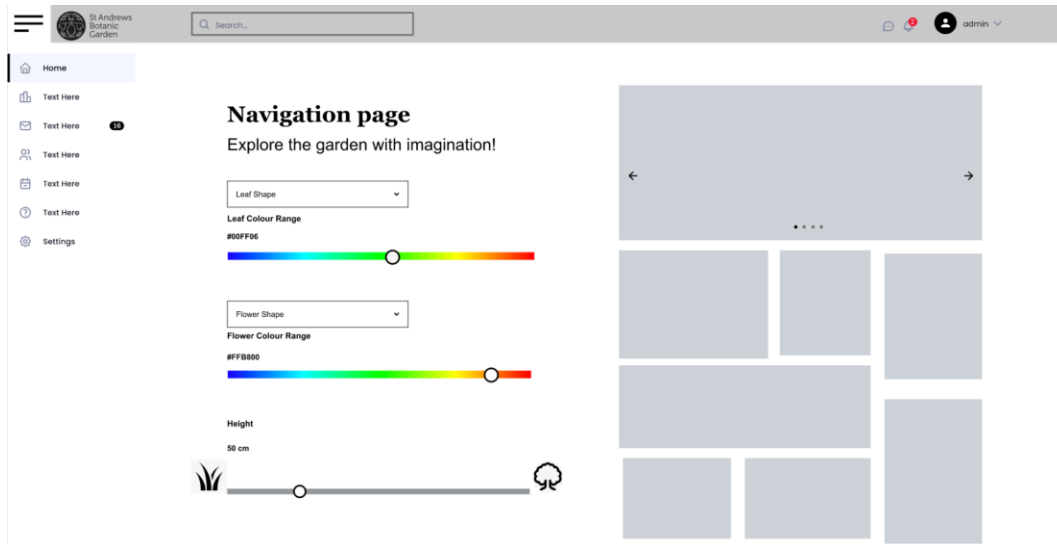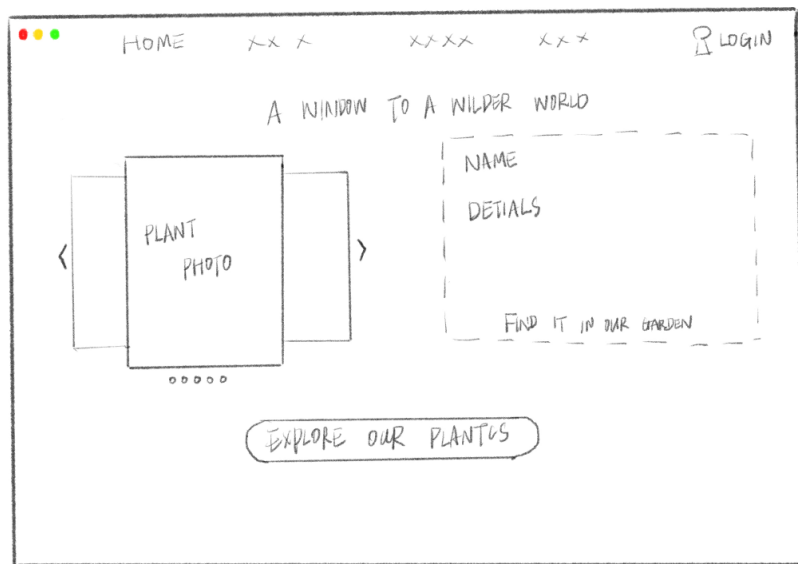
Figure 18.

Figure 19.

and image recognition were possible for mobile users, the team wanted to find something similarly intuitive for desktop users as well. Another advanced solution is therefore an intuitive search method based on visuals rather than scientific attributes. What size of a plant are you looking for? What colour is it? Figure 18. shows exactly this. Upon opening the search page, the user can choose between different physical attributes of the plant and as they make their choices, the image cards on the right-hand side update dynamically. The user can of course click on one of the cards and thus access more information about the plant. This prototype was once again built with quite a high level of fidelity, but with finer details omitted. Again, this is to show the functionality of the app in hopefully a rather realistic setting, but utilising placeholders to not distract the viewer from the point of the prototype.

Explore Page
Closely related to the Intuitive Search page is another functionality that we have dubbed the Explore Page. Essentially, this is another so-called out-of-the-box functionality for visitors of the web portal with less knowledge of plants. Of course, it could also be used by someone just wanting to browse the database in a nice way. It is depicted in Figure 19. and shows "plant cards" that the user can scroll through. It could showcase such things as the latest additions to the garden or interesting seasonal plants. This prototype is a lot lower fidelity and is in fact used in the last assignment as a sketch. We decided to use it here again as we believed the idea was worth repeating and holding on to. We believe Figure 19. does a great job at conveying the intended idea and functionality. It works excellently towards the attempt to introduce more

novel concepts, as well as catering to the visitor user group while contributing to the Garden's attempt to re-establish their scientific mission to the wider public.

In conclusion, the team believes the modular approach taken delivers a highly adaptable but concrete vision for the web portal. Not including colours or focusing too much on visual design allowed many of the prototypes to showcase features and usability. That being said, we still managed to use high fidelity prototypes to show outlines of for example the advanced administrator pages. While the shape of a button is not always of

essence in a particular design, its position plays a more important role. Nevertheless, Figure 1. was specifically designed to bind all the functionalities together with a visual agenda. Overall, we did not want the web portal to deviate from the existing visual identity provided by the client, but still offer novel ideas and some fresh outlooks on design choices.

Analysis of Key Alternatives

During the first interview with our client, he introduced us to a term none of us had heard of before: holobiont. As we came to learn, it is a term coined for the entity
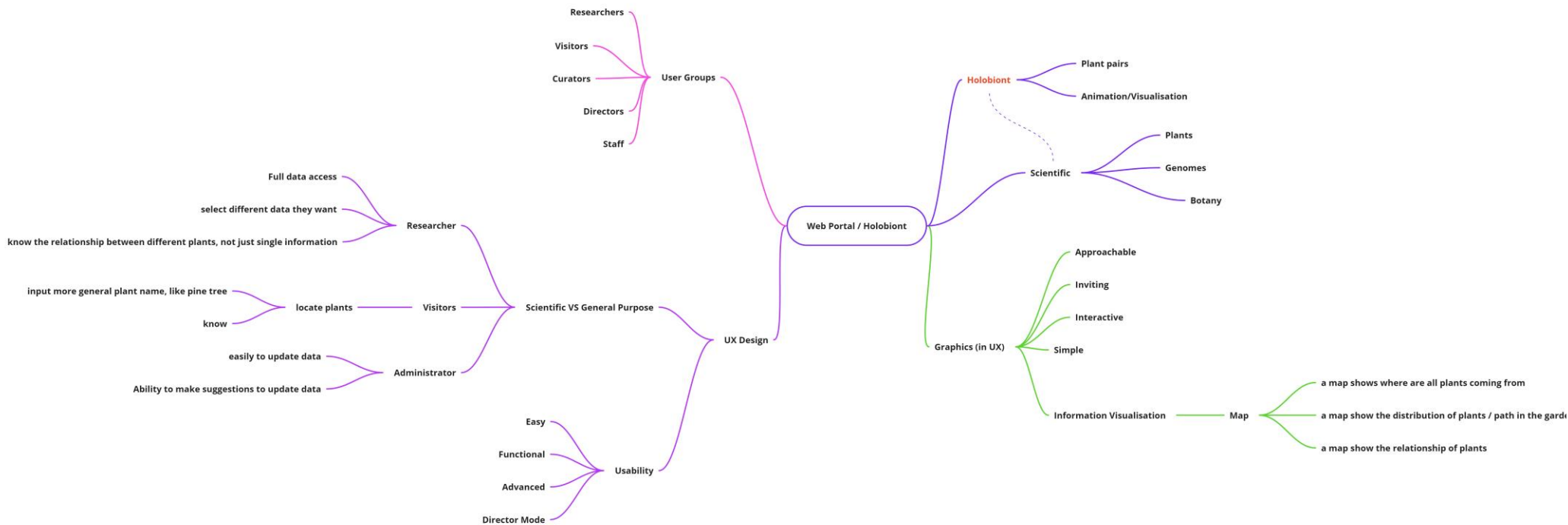

Figure 20.

that is a host plant and all the species living in and around it. A holobiont consists of the host, viromes, microbiomes, and more, and as such it can be argued that plants in general fall under this category. In fact, humans are also a good example of holobionts. While the concept does come with its debate around it, the general idea is directly extendable to our project. Is it perhaps possible to showcase more than just traditional plant data in our portal? The team spent a considerable amount of time pondering this fascinating concept and finally came to two conclusions.

First, it was decided that the concept of holobionts would not be pursued in our designs and prototypes. This can be seen in Figure 20. as the branch highlighted in red. The reason for this was that while the extension is completely possible, the adaptation did not completely fall under our jurisdiction. As seen with each prototype that displays data, our job centred around providing a platform to display information on, not to design the information itself. Thus, the concept can well be integrated if the database supports it, but the issue is not necessarily in our hands and cannot be tangibly prototyped within our specified scope.

The second conclusion the team came to was that the importance of the concept for all our coming work. The definition of a holobiont wraps all individual species in and around a host into one package, and this came to be an accurate description of how we saw the web portal and its design. We allowed the term holobiont to take its position at the very middle of our mind maps, envisioning each branch and component as both its own living organism and a vital part of the overall product (seen in Figure 20.). This approach also led us to the presentation of our prototypes in this report, where we introduce different components, often made by different team members, that together make the web portal as a whole. While not pursued in a design sense, the concept of the holobiont came to immensely influence our work and ultimately guide us to an outcome we are proud of.

Breakdown of Contributions

Fortunately for the whole team, it can safely be said that all members have once again contributed in some way to every part of the submission. This time there can, however, be some information shared about who prototyped exactly what. Student 210005315 was responsible of figures 6. – 11., student 210009468 made figures 3. – 5. and 15 - 18, student 200036885 designed figures 12. – 14., and 210032448 prototyped the landing page (figures 1. and 2.). While the time spent on the assignment was about equal between the group members, the three first mentioned members were more concentrated on the designing and prototyping of the project, while 210032448 dedicated more time towards writing the report. Overall, the functionalities and planning of all the different parts and workflow were a team effort.

Appendix:

Due to the static nature of the PDF report, here are all the prototypes made as links to the interactive versions.

Landing Page
Includes a working side bar and a scrollable interface.
https://xd.adobe.com/view/f39e06f6-7024-4337-a8a1-3acb307e26d3-a6cd/

Visitor Data View
Clickable parts are the image and the "see more information" link.
https://xd.adobe.com/view/3aac68df-c011-40fd-b006-b9714d16c7b6-6fff/

Administrator Page
The prototype highlights the clickable sections when a blank section is clicked.
https://modao.cc/app/906c37e683e0ae0c05a1789a69169502be05cd7b

The Interactive Map
The workflow for the map is the following:
Plant 1 – Locate → Plant 2 – Locate → Plant 3 – Locate → Click the black marker on the map → Click save.
https://www.figma.com/proto/P7tbt3T1kFlyoMfFHFyPtt/Map?node-id=2%3A3&scaling=scale-down&page-id=0%3A1&starting-point-node-id=2%3A3&show-proto-sidebar=1

Mobile Functionalities
Mobile map: "Search via current location" is clickable.
https://www.figma.com/proto/7kDk3XBLPCNdjuq8NaH4KE/Map-Mobile?scaling=scale-down&page-id=0%3A1&starting-point-node-id=1%3A2&show-proto-sidebar=1&node-id=1%3A2

Camera icons for the QR code frame and the image recognition frame are clickable, as well as the hamburger icon in the middle frame, and the picture in frame three. In the General Info page, the shop, share, and more details sections are also clickable.
https://xd.adobe.com/view/e0178540-6e7f-4d89-889b-9131ad46d928-b544/

An Intuitive Search Method
https://xd.adobe.com/view/2d762ea0-d89f-42ab-a792-1f96cc6b49bb-7825/

Explore Page
Sketch from Practical 2.