

eVoting Australia

DECO2500 INDIVIDUAL REPORT | SEMESTER 1 2020
LACHLAN WARDROPPER

Table of Contents

<i>Low Fidelity Prototype Evaluation</i>	3
Design Walkthrough	3
Co-Design	7
Technology Acceptance Model.....	10
<i>Medium Fidelity Prototype</i>	12
Revised Requirements.....	12
Revised Problem Statement.....	12
Revised High-Level Description of System.....	12
Additional Interface Metaphors.....	12
Revised System Requirements.....	13
Personas	15
Interaction Scenarios	18
UX Goals	25
<i>Medium Fidelity Prototype</i>	29
<i>Medium Fidelity Prototype Evaluation.....</i>	32
System Usability Scale (SUS).....	32
Think Aloud & Time on Task	35
<i>High Fidelity Prototype</i>	39
Revised Requirements.....	39
Revised Problem Statement.....	39
Revised High-Level Description of System.....	39
Additional Interface Metaphors.....	39
Revised System Requirements.....	40
Revised UX Goals	42
<i>High Fidelity Prototype.....</i>	46
<i>High Fidelity Prototype Evaluation</i>	50
Heuristic Evaluation.....	50
Cognitive Walkthrough	57
<i>Conclusion.....</i>	61
<i>Bibliography</i>	62
<i>Appendix.....</i>	65
<i>Low-Fidelity Prototype Evaluation</i>	65
Design Walkthrough Evaluation Protocol.....	65
Design Walkthrough Evaluation Results	67
Co-Design Evaluation Protocol	72
Co-design Evaluation Results	74
TAM Evaluation Protocol.....	78
TAM Evaluation Results.....	80
<i>Medium-Fidelity Prototype Evaluation</i>	82
SUS Evaluation Protocol.....	82
SUS Evaluation Results.....	84
Time on Task and Think Aloud Evaluation Protocol	87
Time on Task and Think Aloud Evaluation Results	89
<i>High-Fidelity Prototype Evaluation</i>	92

Heuristic Evaluation Protocol	92
Heuristic Evaluation Results	96
Cognitive Walkthrough Evaluation Protocol.....	101
Heuristic Evaluation Results	102

Low Fidelity Prototype Evaluation

Design Walkthrough

A design walkthrough is a practice that allows a designer to gain validation of design decisions related to the development of content, design of graphical user interface, and elements of product functionality (Goel, 2009). In the context of this project, it has been used as a process to see whether the conceptual design has helped the user to navigate a prototype, as well as recover from errors without assistance. By testing at least five people representative of a targeted user, a majority of common usability problems can be identified, so long as the users come from a diverse range of cultural and technical backgrounds. The users for this evaluation method were found through mutual work colleagues and social friends and were all of diverse ages and social backgrounds. This allowed for the most effective results since the various mental models of each user were very different.

Ideally, a design walkthrough would be conducted in-person by setting a user a common task that would be performed with the system. However, due to social distancing laws it was not possible to conduct a session in such a manner. Instead, the design walkthroughs were conducted via *Zoom*, which although effective, did limit the outcomes of the tests due to communication issues caused by the technology. Prior to conducting any walkthroughs, *Adobe XD* was used to import the paper prototype images in order to create a click through prototype. This allowed the users to virtually replicate the process of selecting elements of the screen to navigate the system. Next, as seen in the *Design Walkthrough* section of the appendix, an evaluation protocol was designed with the aims of exposing the user to as much core functionality of the system as possible. By doing so, it showed the user an array of design decisions that could thus be analysed quantitatively and qualitatively.

The evaluation protocol set the users the task of navigating to the campaign screen, where they were able to view the various candidates running in the virtual election. Next, they were asked to cast a vote and view the current results of their local division. They were given ten minutes to complete the task, which was deemed to be a realistic timeframe given that on average people spend approximately the same time in the voting booths (Katakam, 2014). At each point in the design walkthrough, the user was analysed for quantitative data such as total number of clicks and time taken to complete a sub-task. This allowed for the possibility of using quantitative data to identify design elements that needed to be reassessed in the next phase. Alongside this, qualitative data was constantly recorded by asking the user at each screen what they thought about the design, as well as what they expected from the page. By doing so, it was easy to gain a deeper insight into the gaps between the conceptual model and the user's mental model. Additionally, it provided direct feedback regarding the interaction flow of the model and the effectiveness of UI elements.

After conducting five separate evaluation sessions following the protocol provided in the appendix of the report, it was clear that there were aspects of the UI design and interaction flow that were difficult for users despite their different experiences with technology. In order to gain an in-depth understanding of the issues for each feature, the protocol was split into three main phases. Each phase focussed on a different core-feature of the system, and thus the subsequent analysis will be divided by those features.

Candidate Information Screen

The general consensus from all users who participated in the design walkthrough evaluation was that the candidate information screen was minimalistic and did not overwhelm the user with information. The idea behind the design of this screen was to utilise the gestalt principle of symmetry by having the menu items displayed in an even grid. Additionally, the card-based metaphors representing clickable menu items were designed to be functionally and visually consistent with the home menu, thus increasing predictability for the user. One participant stated:

“I like how the different menu options are nice and large. I don’t feel overwhelmed by all the options on screen which is nice. When I look at the campaign information screen, I see a pretty simple layout, and I’ve had no real issues so far trying to find information.”

Despite the positive feedback regarding the UI design of the candidate information screen, the average time taken to navigate from the home-screen to the information of John Doe in the candidate page was 8.6 seconds. Figure 1 below outlines the spread of data pertaining to time taken for each user.

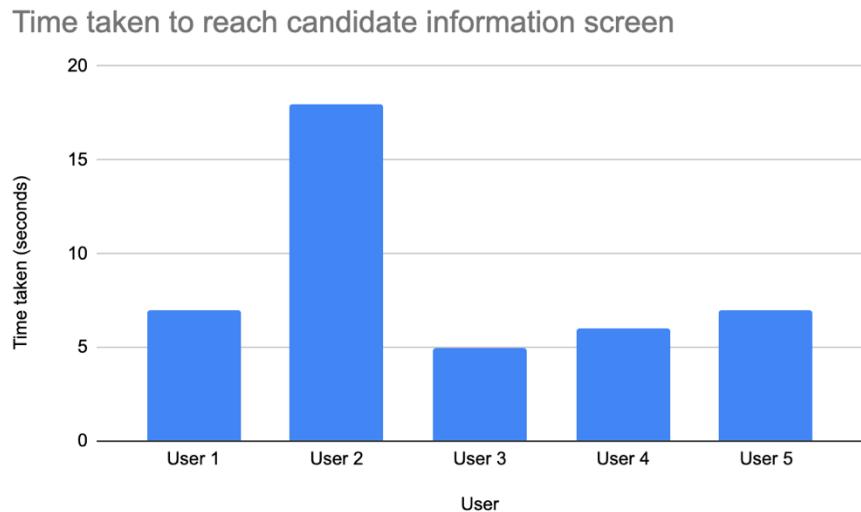


Figure 1: Time taken to reach candidate information screen

As outlined by Figure 1, this average was heavily influenced by User 2, who took 18 seconds to complete the task. Apart from this outlier, the spread of time taken was fairly consistent, suggesting that most users had a similar experience with the system. However, the comments from User 2 suggest an issue with the design of the candidate information screen. User 2 stated that *“I didn’t know you could press the different candidate buttons to read more”*. As a result, they spent a long period of time pressing various buttons in the hope of viewing information. Looking at the technical background of User 2, it was found prior to the session that they had little experience with phone applications, and generally avoided interaction via mobile devices. Consequently, the mental model of this user was different to that of those who are experienced with mobile applications, since most users interact with their phones on a daily basis. The idea of using cards as a way to navigate through a system is not new to mobile computing, and thus should look to be enhanced through colour and animation in order to help guide people with less experience using similar apps. Furthermore, card-based metaphors are effective since they are easy to process, visually attractive and are beneficial for various screen sizes (Babich,

2016). Thus, as explicated by Figure 1, those more familiar with mobile applications tend to find this layout of information effective.

Another interesting outcome of the design walkthrough evaluation in regard to the candidate information screen was the positive feedback concerning the use of metaphors. The intention of these was to draw from people's past experiences in order to help them learn the system faster. In particular, by using universally recognisable images, they were aimed to benefit those who may not have much experience with the Australian voting system specifically.

In terms of the interaction flow of this part of the system, there were some issues found amongst participants. One comment by User 3 – a regular user of mobile apps, was that navigating the various campaign pages was not as efficient as it could have been. More specifically, they noted that in order to view another candidate's information, one must exit the current candidate page and re-select a new one. User 3 instead suggested 'tinder-like' swiping functionality, where one can navigate between candidates with a simple swipe of their finger. It is interesting that the younger age and technology-dependent lifestyle of User 3 clearly had an impact on their mental model, and as a result they drew references from other app's functionality. Furthermore, this feature should be considered in order to simplify the interaction flow for those familiar with apps who use the swiping functionality. However, for those with backgrounds similar to User 2, this could well cause additional confusion due to a lack of visible buttons. Thus, if this design element were to be implemented, it must supplement the current interaction flow whereby there is a visible back button to exit the page.

Voting Screen

In regard to the voting page of the system, all users found it to be somewhat of a familiar layout and none had difficulty navigating this particular page. The premise of this was to use the metaphor of physical ballot paper to help users understand the functionality of the screen. The main issues in this section of the design walkthrough evaluation seemed to stem from a flawed interaction flow when moving from the candidate information screen to the voting screen. Specifically, when looking at a candidate's information page, there were two buttons located next to each other, one to go back to the candidate summary page and one to skip straight to the voting screen. The premise behind the 'Vote Now' button on this page was that it would aid cognition for a user, since their short-term memory would likely be overloaded by the large amounts of information they had just processed. Therefore, they would skip straight to the voting screen after they found a candidate who appealed to them most. User 5 explicated this idea when they stated "*It was nice that I could go straight from the candidate to vote. If there was actually stuff on the page, I wouldn't forget it*". Instead, the issue appeared to stem from the close proximity of the 'Go Back' and the 'Vote Now' buttons, with one user stating:

"It was fairly similar to what I would expect really, the actual voting screen was pretty similar to the one you'd normally see. I wasn't expecting the go back to be right next to the vote now button though, I accidentally pressed it thinking it was the other one. Apart from that I think I was pretty quick really."

It is evident from this user's comments that the close proximity of the two buttons effected their interaction with the system. Gestalt principles identify proximity to be a method of showing that two objects are related (Todorovic, 2008). Thus, having two buttons with completely different functionality located next to each other is not ideal. Also, both buttons are similar in shape and size, which again, according to Gestalt principle implies an association.

Thus, removing the ‘Go Back’ button from this page is an appropriate solution that would help guide users whilst navigating the system.

In terms of the actual functionality of the voting screen, due to the nature of performing these sessions online, it was not feasible to test the user’s interaction with ordering votes. This will have to be assessed in a future iteration. However, feedback from users suggests that the layout is recognisable, and no comments were made suggesting issues with the UI design.

Results Screen

The design walkthrough sessions provided sufficient insight into issues pertaining to the design of the results screen as well as the interaction flow when moving from the voting screen to the results page. Initially, the task set for the users was to navigate to the Forde tab of the results page, however after the first evaluation session this was found to be confusing, since the protocol did not clearly explain the task. Thus, the protocol was amended to ask the users to simply reach the results page. The first notable design element that surprised users was the ‘see results’ link in the voting screen. Multiple participants commented on the formatting of the text, with one explaining that “*the see results link wasn’t very big compared to the home button*”. As a result, the intended interaction flow of this phase of the evaluation was missed by some users. Instead, 60% of users navigated to the results page from the home screen. In order to address this issue, it is first important to look at the diversity of users who failed to see the link on the screen. Of the three who commented on the design, two were young people who claimed to be familiar with mobile technology. Both of these user’s commented that they had seen the link but had immediately gone to press the large home button displayed at the bottom of the screen. Consequently, they had interacted with the system prior to processing all of the information on the screen, which is a trait that is increasingly being identified in younger users of technology (Gottschalk, 2019). Consequently, a way to encourage these types of users to process all of the information is to utilise card-based metaphors to list the possible ways to interact with the system after voting. This would ensure that all information is easy to process quickly but is still visually attractive if images are used in accordance with text. Figure 2 below outlines the effects on time the poorly designed navigation menu had.

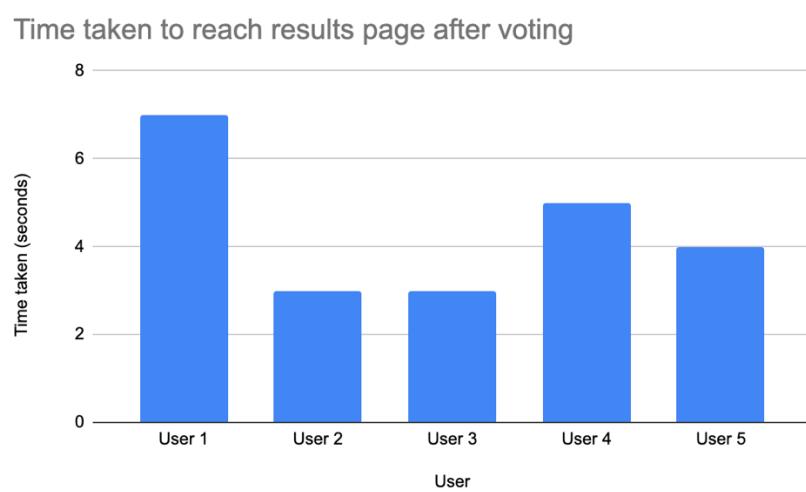


Figure 2: Time taken to reach results page after voting

Figure 2 identifies the differences in time between users to reach the results page of the system. Specifically, it shows the ideal time taken if the interaction flow of the system is followed

correctly. Additionally, it outlines the impact of Fitts's Law, which states that the time required to move to a target area is a function of the distance to the target divided by the size of the target (Purwar, 2019). Even for those who followed the correct interaction flow, it still took three seconds to press the link for the results. According to Fitts's Law, this is because of the relatively small size of the text, as well as the placement at the bottom of the screen (Purwar, 2019). Thus, both of these factors should be altered in order to hopefully reduce the time it takes for users to process the information on the page.

Participants also expressed their belief that the results page itself contained a lot of information. Specifically, the list of results for different divisions in a table format seemed to confuse users. Hick's Law could explain these observations, since all district options were listed in such a way that users would have to search all possible choices. Hick's Law expicates that a system should be as simple as possible whilst being functional, which is definitely applicable to the current layout of the results screen. Instead of listing districts in a table format, utilising card-based metaphors by placing all divisions of a certain state in one card could help reduce cognitive overload. Coupling this with Gestalt Principles, including symmetry and continuity would almost certainly help address the concerns of users. Thus, in future iterations of the design, the results screen will need to be simplified and tested more thoroughly from a diverse range of users in order to gain better insight into design decisions.

Post-Interaction Questionnaire

The post-interaction questionnaire found in the appendix was sent to all users via *Zoom* chat, where they were then asked to fill it in at a convenient time. The aim of the survey was to give users time to reflect on the system, as it would hopefully elicit a more detailed and thoughtful response. First, the participants were asked to rate how easy they found the tasks on a scale of 1 to 5, with the range of results being 3-5, and the median being a 4/5. This indicates that users generally found the system fairly easy to interact with for the given tasks. This is very positive feedback, as the tasks that were performed are reflective of the interactions someone would typically make with the app. It is thus essential that these core tasks are designed with simplicity in mind, and whilst not perfect, the results of the survey indicate that this has occurred to an extent.

A common theme found throughout the questionnaire that was not focussed on during the evaluation sessions was the importance of security. The users were asked whether they would ever use the system in the future, and the majority of responses were a conditional yes, so long as the app was secure. Whilst the actual security methods being used in the system are beyond the scope of this project, incorporating security into the design elements of the app could be an effective way to encourage users to use the system. Specifically, including trust badges or secure logos on key features such as the home screen and voting pages could act as visual reminders that the system meets the security needs of users. Thus, this should be incorporated in future design iterations in such a way that they are present, but do not intrude on the user's interaction with the app.

Co-Design

The co-design evaluation technique was utilised as it provided a deeper insight into the user's expectations of the system. This technique encouraged the user to draw alternative designs for various pages, as well as obtaining their own design ideas in regard to functionality and flow. In comparison to other evaluation techniques, co-design was the most involved, and thus elicited a deeper response regarding their own expectations of the system as well as certain metaphors that made sense to them. The co-design sessions also provided useful information

pertaining to immediate observations of the system, as well as conversations with each individual user. The users for this evaluation technique were unique to the other methods, and again were found with the intentions of diversifying factors such as cultural and social backgrounds as much as possible.

The co-design sessions were again run virtually through *Zoom* and utilised the same *Adobe XD* workflow as used in the design walkthrough evaluations. This time however, each user was given a demo of the system using the digital version of the paper prototype by using the screen share function in *Zoom*. As seen in the *Co-design* section of the appendix, a protocol was devised that aimed to show the user as much functionality as possible, and constantly reminded them to ask questions or voice their concerns regarding the design. After each participant was taken through the demonstration, a discussion was initiated by asking them if they found anything to be surprising. This was done with the intention of identifying their expectations of the system, which provided deeper insight into their own mental model as well as limitations of key design elements. Using interview techniques such as long pauses and prompts helped elicit a response at this point. Once the participant had some form of an answer, it was important to expand on it as much as possible by asking them more questions, getting them to walk through their own interaction flow, and asking them to redraw the certain page to better suit their own mental model. Whilst it is dangerous to base a design off of one participant's feedback, collating the responses allows for a design that best suits a larger range of people.

Home Screen

Generally, the feedback received from the co-design evaluations was positive, with no user identifying multiple issues with the system. One participant did however identify valid problems with the home screen that were ignored by all others. Specifically, the participant stated that they were “*surprised to see the profile option as a main menu button*”. They instead argued that it wasn’t as significant as other menu items, and that the metaphors for the profile and candidate information were too similar and thus caused confusion. This is definitely valid feedback that should be considered in the next iteration. Since no other users noticed this feature, changes to the conceptual model should not be made immediately, however alternative designs should be tried. Their altered design drawing can be found in the *Co-design evaluation results* section of the appendix and outlines an interesting way to format the home screen. This participant used a divider to separate the important functionality from secondary functions, which could help a user navigate the system.

Candidate Information Screen

Comments from the candidate information screen appeared to confirm the consensus of users who interacted with the system during the design walkthrough evaluations. Specifically, one user questioned the design of the John Doe information page and proposed the idea for a ‘voting list’ where users can set preferences before voting. As shown in Figure 3 below, the participant removed the unnecessary ‘Go Back’ button and instead championed simplicity in their design.

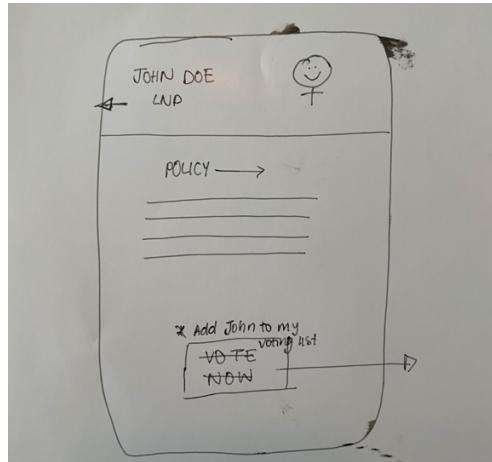


Figure 3: Alternate candidate information screen design

As stated previously, this observation has been noticed by many users in different evaluations and thus will need refining. The idea of the ‘voting list’ could be an interesting concept but could also complicate the system. This participant was of a younger age and high-level education, and thus has probably had some experience with more complex technology. Furthermore, those with less experience using technology would benefit more from the ballot paper metaphor already implemented. Therefore, this feature could be added to future iterations, but would need extensive testing amongst older demographics.

Voting Screen

The voting screen itself received positive feedback from all users. The vote submitted screen was however criticised for its poor design. More specifically, the ‘see results’ and ‘send proof’ buttons were said to be “*too small and not really needed*”. Instead, one user proposed that the ‘send proof’ button be removed, and this process be automatically done. They then suggested that the buttons be placed next to each other, as shown in Figure 4 below.

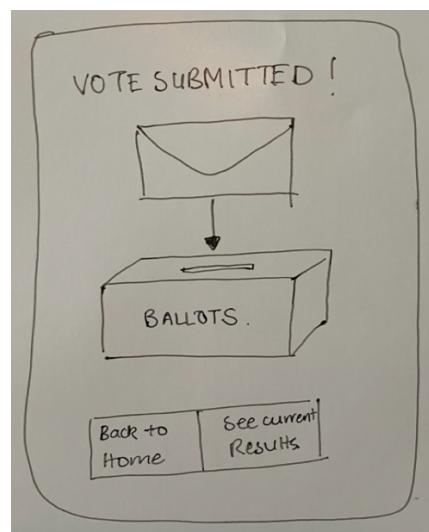


Figure 4: Proposed vote submitted screen

This design is interesting as the format of the buttons suggest home is moving backwards in the interaction flow whilst seeing results suggest moving further along the system. This could be further outlined by using arrow shaped buttons, which according to the Gestalt Principle of common fate, would help explicate the actions of each button. This design would also help

decrease the time taken to make a decision, which was outlined in Figure 2 as being a problem with the current design.

Results Screen

Multiple participants during the evaluation sessions outlined their concerns with the current results screen. 60% of all participants said they had a problem with the amount of information on the page, and that it wasn't necessary. Instead, one participant proposed that card-based metaphors be used to take users to the more detailed sections, as "*most people aren't interested in the results of divisions*". A hand-drawn image of this proposed design can be found in the appendix. Since the goal of this app is to simplify the voting process, it makes sense to remove as much unnecessary information as possible. Thus, the results page should contain minimal information, with more detailed results being optional for users.

Technology Acceptance Model

The final evaluation method used was the Technology Acceptance Model (TAM). This comes in the form of a survey and aims to determine how likely people are to accept and use some technology. In particular, TAM targets questions based on external stimulus, cognitive response, intention and behaviour. This allows for quantitative data that points to an area of a problem, however, does not provide sufficient information to diagnose the concern. Additionally, TAM identifies two of the biggest factors to a technology's adoption and usage to be perceived usefulness and perceived ease of use (Sauro, 2019). Thus, a portion of the questions in the TAM survey are based on gaining information regarding these factors. Due to the fact that this survey was being conducted using a low-fidelity paper prototype, it was also deemed that perceived ease of use would be the dimension that would be elaborated on during the evaluation sessions. This is because it helps gain insight into whether the conceptual model of the app and the user's mental model are aligned. Based on these quantitative results, as well as the results of other evaluation methods, various design elements can be altered in future iterations.

In the context of this project, TAM was used in conjunction with the design walkthrough evaluation protocol discussed previously. This was because in order to provide and discuss the TAM survey, the participants had to be given an introduction to the system. Thus, since the design walkthrough protocol aimed to show the user as much core functionality as possible, it was ideal to combine the two. Much like the design walkthrough protocol, users were set tasks pertaining to core functionality using *Adobe XD* and *Zoom*. After this, they were sent a google forms document containing the TAM survey, and then a discussion was initiated via *Zoom* focussing solely on the perceived ease of use of the system. This was the focus of the session as it was believed to be a strong indicator into the current design and interaction flow of the system.

Overall, the results of the TAM survey suggested positive feedback from all five respondents. However, as stated previously, the analysis of the TAM survey aimed to focus more on perceived ease of use and perceived usefulness. Consequently, this section of the report will focus mainly on these aspects of the survey. A full list of questions and results can be found in the *TAM Evaluation Results* section of the appendix. Table 1 and Figure 5 below outline the results of the questions that were mainly be focussed on.

Dimension	Question
PU1	I can accomplish my voting in a general election more quickly using eVoting Australia
PU2	I can accomplish my voting in a general election more easily using eVoting Australia
PU6	Overall, I find eVoting Australia useful
PEOU1	Learning to use eVoting Australia is easy for me
PEOU2	It is easy to use eVoting Australia to accomplish voting in a general election
PEOU3	Overall, I believe eVoting Australia is easy to use

TAM Responses

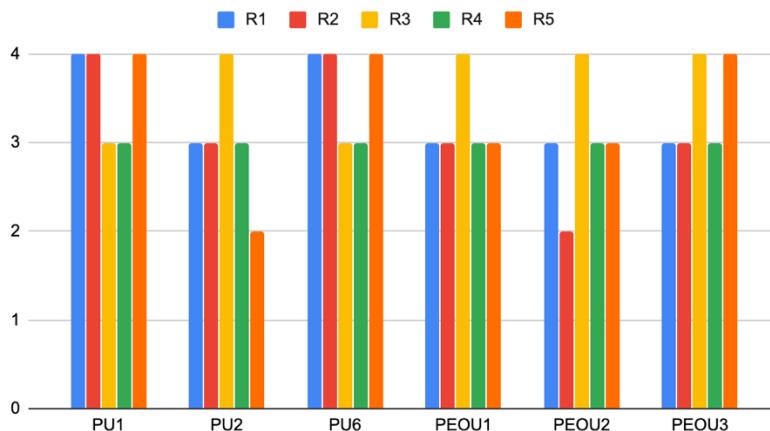


Figure 5: TAM survey responses

As indicated by Figure 5, the perceived usefulness of the prototype was fairly high, however there was some variance between respondents. In particular, PU2 suggests that not all users find the technology to be an easier alternative to traditional voting, as outlined by Respondent 5. When asked to justify their response to this question, Respondent 5 explicated their poor knowledge of mobile apps, and argued that traditional voting methods are more familiar to them. This response furthers the argument that the design of the app needs to be refined to help include those who do not use a mobile device regularly. When asked if there were any features in particular that needed to be altered to help the respondent, they stated that the “*app overall needed to be simpler*” and that many features included in the app weren’t important to them but were also unavoidable. This provides great insight into what needs to be altered in future design iterations in order to increase the range of users interested in the app. Apart from Respondent 5, all users responded relatively positively to PU2, with the majority justifying their answers by saying that time would definitely be reduced and the freedom to vote anywhere would make the process easier.

The responses regarding perceived ease of usefulness shown in Figure 5 also illustrates that generally, respondents found the prototype easy to learn and use. The variance in the results was minimal for PEOU1 and PEOU3, and no constructive criticism was provided by respondents that could be used to refine the conceptual model. In response to PEOU2, Respondent 2 justified their lower score by arguing that there is not enough evidence to agree to that statement. Whilst this statement is accurate since a low-fidelity prototype was used, it does not help alter the design of the app. Additionally, Participant 1 responded by saying that the prototype seemed to lack any form of reminders, which would be essential for the app to be learnable. Thus, this will need to be incorporated into future design iterations to aid the

cognition of users. All other responses were fairly brief and positive, resulting in less than desirable insight to be used in analysis.

Overall, despite some critical responses found in the survey, feedback from respondents was very positive and indicates that the app is generally fitting a user's mental model. Having said this, the TAM survey highlighted that the interaction flow of the app needs to be simplified in order to consider people with less technical experience. Furthermore, the interaction flow of the app has been identified to be an issue in other evaluation methods, and thus this should be focussed on in the next iteration in order to simplify the app. Increasing the system's learnability is important in order to appeal to a diverse range of users, which due to the nature of the app must be considered a high priority.

Medium Fidelity Prototype

Revised Requirements

The low fidelity prototype evaluation provided deep insight into some of the flaws identified with the system. The next step of the design process is to revise the requirements of the system and add information about the user, their needs and values. In order to effectively achieve this, the impact on the conceptual design due to the revised design must be explored.

Revised Problem Statement

Design and develop an application to be used on mobile devices that allows people to vote from anywhere on election day, and provides equal opportunities for parties to present their policies without being intimidated by campaigners, as well as providing a way of tracking the current status of the election and keeping voting secure to ensure election results are not tampered with.

Revised High-Level Description of System

The system aims to allow all registered voters to choose their candidate preferences and vote on election day. It will provide the user with all the relevant information to make an informed decision based on party policies. It will track the current state of an election. It will allow a user to uniquely identify themselves using an identification number. It will alert a user when to vote. It will help users navigate through the complex voting system in Australia.

Additional Interface Metaphors

Based on feedback from the low-fidelity prototype evaluation sessions, the security of the app was found to be a common issue amongst respondents. For example, in the post-interaction survey for the design walkthrough sessions, many respondents explicated their willingness to use the system so long as it was secure. Whilst the actual security system implemented into the app is beyond the scope of this course, incorporating a metaphor into key screens to remind users of the secure nature of the app is an ideal way to attract more users. Thus, including trust badges or secure logos on key features such as the home screen and voting pages will act as visual reminders that the system meets the security needs of users. Hence, this should be incorporated into future design iterations in such a way that they are present, but do not intrude on the user's interaction with the app. Figure 6 shows the secure trust badge that will be used in further design iterations.



Figure 6: Secure trust badge

Revised System Requirements

Voting on Election Day

Secondary Level Feature

Key interface needs to replicate a typical ballot paper as much as possible

Rationale

Voting will be used by all members of the public on a given election day despite their technical backgrounds.

Notes

Person may have never had experience using technology, and since voting is meant to be in private, people are not able to assist someone at the time of voting. Also, people may be overwhelmed with information at the time of voting after hearing or reading campaigns. Therefore, the voting screen needs to have the minimum amount of content and allows people to follow a familiar method. The use of metaphors and direct feedback are essential for this feature. In countries where voting is not compulsory, a simple process would help boost voting turnout, with online voting projected to increase youth turnout by 26% (Chowdhury, Viral Voting, 2014).

Campaigning via the App

Secondary Level Feature

There must be equal opportunities for parties to summarise their campaign on the app in order to remove bias.

Rationale

The user may miss certain parties campaign points if not correctly laid out due to lack of time or knowledge of where to look.

Notes

The design of the campaign page must be a grid and fit on one screen so all parties can be viewed without scrolling. Parties should be easily identified so people can click what they want since 93% of people already know who they are voting for prior to the election (Fowler, 2013). The person should not feel obliged to read all party policies; therefore, information shouldn't be presented unless a party is clicked by a user. Information should be clear and concise and contain information about a member and the party as a whole. Also, users need to be able to re-visit campaign information whilst in the voting screen so that they do not rely too heavily on their long-term memory.

Displaying Real-Time Results

Secondary Level Feature

Results interface needs a clear way of displaying data

Rationale

The electoral system is very complex, and a lot of different results are of interest to voters, therefore information needs to be laid out simply and allow people to see what results interest them.

Notes

The average voter would be most interested in the overall result of the election, so that should be the default graph. There should also be an option to see different division results that display the same graph. As shown in the research section, having instant results would remove the week-long period in most countries where votes are being counted and there is no governing body.

Securely Manage User Data

Secondary Level Feature

Research indicates security to be the primary concern for users, so the app must handle data in a way to eliminate risks of cyber-attacks.

Rationale

Voters will not use the system if it is not secure, and if results were tampered with then repercussions would be detrimental at national scale.

Notes

The system must be able to store and encrypt data in such a way the cyber-attacks are minimised. According to a survey conducted in the research phase, only 54% of people trust current technology (Smith M. , 2015). The only way this can be increased is through trials of the system that prove its capability. Without this underlying feature, the app's usability is non-existent and irrelevant. Additionally, the use of a secure trust badge within the app will help remind users of the security measure implemented, which previously effected the willingness to use the system of 60% of all survey respondents.

Customise Profile Information

Secondary Level Feature

Users must be able to edit key profile features including their address and telephone number in order to ensure the electoral committee can easily track changes in personal information.

Rationale

Voters will be reluctant to use the system if they are still required to use a different website or fill in a form to notify the government of changes in key details.

Notes

The system will incorporate a simple interface that easily allows users to securely update their basic information. This information will be stored in a database that tracks the contact details of voters. Users will be reminded that their details are secured on this screen through the use of the lock interface metaphor (see Figure 6), and a small description allowing users to read more about specific security features. Also, the profile page will be structured similar to other prolific apps in order to aid the cognition of users familiar with other mobile apps.

Personas

The first step of the revised requirements process is the creation of goal directed personas that aim to help identify different categories of users in order to better empathise with those using the system. The three personas created were based upon research conducted when defining the first system requirements and aim to accurately portray users within the focus of the project. The premise was to create a diverse range of users, all from different socio-economic backgrounds who have completely different views of the world. Additionally, it was essential that the personas have completely different lifestyles in order to see how the app conveniences a range of people.

Persona 1 - Isabelle Sommerville

The first persona that was created aimed to represent the extreme upper bounds of a user of the system. Specifically, Isabelle was designed to be a user who is young, has a high IQ, is well-educated and is work-oriented. These main features were identified in the initial background research phase of the project. Firstly, the young age of Isabelle was driven by the fact that in the UK, it is estimated that voter turnout would increase by 26% if online voting was an alternative option (Chowdhury, Viral Voting, 2014). This clearly implies that young people would comprise a fair percentage of the app's user group. Additionally, 58% of young people between the ages of 18-28 work shift jobs (ABS, 2010), which is also a key user group the app targets. This is why it was decided for Isabelle to work in the medical field, as it put her into the category of shift work but also was a way to represent her higher than average IQ. The high intelligence of Isabelle distinguishes her from most typical users as her ability to identify problems may be more profound, which would help find issues with the current design. Furthermore, from the evaluation sessions conducted for the low fidelity prototype, it was very clear the technical experience played a huge role in a user's understanding of metaphors and interaction flow. Thus, this feature was highlighted in Isabelle, as generally younger people have had the most experience using mobile devices (Sparkles, 2019).

Isabelle Sommerville



Intelligent

Hard-working

Passionate

Caring

Goals

- Complete final residency year in order to become a doctor
- Find a life partner who is happy with their work-life balance
- Become an educator in the medical field

Frustrations

- Finding spare time is difficult
- Lacks energy on days off due to being so tired
- Doesn't spend much time with important friends and family

"I'm forever grateful to be able to do what I love everyday"

Age: 27

Work: Resident Anaesthetist

Family: Single

Location: Gold Coast

Education: Doctor of Medicine

IQ: 138

Information



Bio

Isabelle is currently in her final year of medicine at Griffith University, where she is doing her residency and is training as an anaesthetist. Ever since she could remember, Isabelle has wanted to study medicine, and she wouldn't change her job for anything in the world. Isabelle has been doing 90 hour fortnights lately, and spends most of her time catching up on sleep when not working. Otherwise, Isabelle is scrolling through social media, reading or catching up for walks with friends and family. She was once a state swimmer in high school and hopes she can get back in the pool soon.

Isabelle is an only child, and her family are now retired where they spend their time relaxing and playing golf. Isabelle aspires to be like this one day too. She currently doesn't have any interest in politics, and gets all of her news via facebook, twitter and instagram. Isabelle's parents have voted LNP their whole life, and as a result Isabelle votes the same way. Her days are planned via the iPhone calendar app, and Isabelle says she could not live without her phone. Also, Isabelle frequents Tinder with the hope of finding someone who doesn't mind her busy work life, but has had no luck yet.

Persona 2 – Nathan Hill

Persona 2 was designed to best represent the typical user of the system. Consequently, the user is slightly above the median age bracket of Australia (ABS, 2017), is middle-class, and is a white-collar worker with a small family. Specifically, Nathan works as an accountant, where the median salary is \$60,000 (PayScale, 2020), which is higher than the national average, but still puts him in the same range as a large number of full-time Australian workers. Additionally, the decision for Nathan to have two children is because that is the median number of children per family in Australia (ABC, 2017). Geographically, it was decided that Nathan live in the Sydney suburbs, which again is a very populated area where a 'typical' family would reside. Subsequently, 27.3% of Australians hold a bachelor's degree (Statista, 2019), which is why Nathan is of this level of education, since the majority of those with bachelor's degrees also come from middle class families (Zaloom, 2019). Nathan's intelligence is also slightly above the average range of 85-115 (Cherry, 2019), which was thought to be suitable given his education and career. Finally, Nathan's political interests lie with the majority of others. 93% of Australians have voted for the same party for the past two elections (Skelley, 2019). Overall,

these features help categorise Nathan as a ‘typical’ user and align his beliefs and morals with a large number of Australians.

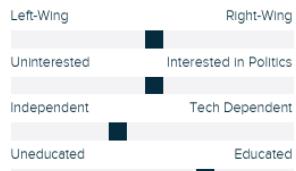
Nathan Hill



"Never take anything in life for granted"

Age: 53
Work: Accountant
Family: Married, 2 Kids
Location: Sydney
Education: Bachelor of Commerce
IQ: 122

Information



Kind Hard-working Respectful Diligent

Goals

- Retire by 65
- Spend as much time with the family while the kids still live at home
- Upgrade the family house to near the water so he can surf on mornings

Frustrations

- Uninformed people complaining about social issues
- Traffic every morning and afternoon getting into work
- Trying to get a promotion but boss seems to be ignoring his efforts

Bio

Nathan is 53 year old senior accountant who has worked in the industry since the age of 24. He finds his job to be quite boring, but enjoys being able to go out and meet clients most days. Having said this, his favourite time of day is 5pm. Nathan has a loving wife of 23 years, and two teenage children. When Nathan isn't working, he is either at the beach with his family where he enjoys to surf with his 16 year old son, or he is at home doing chores and enjoying his time off. Nathan has recently been saving as much as possible in order to start looking at moving his family from Roseville to Dee Why so that they can be closer to the water. Nathan also has a dog called Reggie, who he takes on runs every weekday.

Nathan's relationship with technology has grown over the years, as he has slowly started to understand its use. While at work, Nathan uses his smart phone for business calls, as well as to check LinkedIn and Twitter to see the latest news. Nathan is also subscribed to the Australian and the Sydney Morning Herald, where he spends up to 30 minutes a day reading the main stories via the mobile apps. His interest in politics is growing with his age, but he has other things more important to him. Every night he watches the news with his family, and they all talk about what's going on in the world. Nathan tends to vote for the LNP, but his wife is a supporter of the Greens, so he doesn't identify with any party. Nathan tends to vote based on how he thinks the PM and the party has performed in the previous term.

Persona 3 – Paul Smith

The final persona created for the purpose of revising system requirements was somebody who represents the lower spectrum of users. The first distinguishable feature of Paul Smith is his older age and consequently different world views. Specifically, Paul has strong political beliefs and is actively interested in Australian politics. Whilst the majority of Australians have some interest in politics, only 48% watch it on a daily basis (Fisher, 2019), and Paul aims to capture this type of user. Additionally, Paul has an IQ score in the lower bounds, and has no level of formal education. Instead, he is a retired blue-collar worker, which should provide a much different perspective on politics than the previous personas as well as a different approach to problem solving. Additionally, the lower socio-economic background of Paul would almost certainly affect his experiences with technology, and thus his openness to new technology would potentially be less than a typical user.

Paul Smith



Grounded

Hard-working

Passionate

Patriotic

Goals

- Help his local One Nation candidate win the next election seat
- Spend time with his grandson
- Keep up his daily walking routine

Frustrations

- Left-wing media
- Young people who are ungrateful and entitled
- Governments and companies trying to force everyone to use their technology

"If you don't work hard for it, you don't deserve it"

Age: 73

Work: Retired Bricklayer

Family: Divorced

Location: Newcastle

Education: N/A

IQ: 89

Information



Bio

Paul is a 73 year old retired bricklayer who has not been working for 12 years. He started his work career working as an apprentice for his dad at the age of 14, and was a fully licensed bricklayer by 18. Since then, Paul had owned his own bricklaying business and made enough money to comfortably retire at 61. Despite doing quite well for himself, Paul does not buy anything he doesn't need to, and currently drives the same Holden ute he has owned for 9 years. Paul has lived in the same house for 38 years, and has no plans on moving as it is very functional. Paul was once married many years ago, and now has a grandson who he likes to keep in touch with every now and then. Paul spends his time doing small projects around the house, watching the news, and has recently taken interest in history.

Paul has been a lifelong LNP supporter, however has recently found his beliefs to best align with the One Nation party. Consequently, Paul has reached out to his local candidate and spent many hours last election campaigning in various locations. Politics is now his primary interest, and he spends a large portion of his day watching the news on the TV or reading the many papers he is subscribed to. Paul thinks that everyone should have an interest in politics, and he gets incredibly annoyed by young people who regurgitate things celebrities say to them without any actual knowledge on a political topic. He thinks if everyone was informed during elections, it would be much better for the country. That is why Paul decided to dedicate his time to campaigning. Paul cannot stand technology, and thinks that the world is slowly cutting off traditional media, and he will eventually be forced to comply. Paul's daughter bought him an iPad last Christmas, however after trying to use it he said that he would just stick to his ways.

Interaction Scenarios

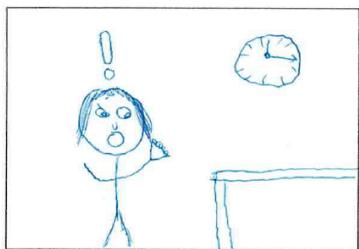
The aim of interaction scenarios is to imagine the personas discussed above using the system in order to identify possible issues with the design. The diverse backgrounds and skills of the three personas should all provide different experiences using the system and will allow for the refinement of system requirements as well as UX goals for the system.

Interaction Scenario 1 – Isabelle Sommerville

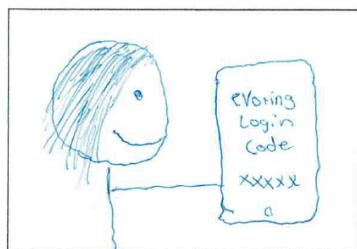
The first interaction scenario was designed to see what would occur if a non-typically intelligent and educated user were to interact with the system. Additionally, it aims to see how a user could utilise the system in a short period of time in order to outline the convenience of the eVoting Australia app.

PERSONA: Isabelle Sommerville

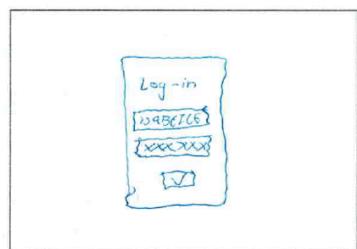
USER STORY/SCENARIO: Opening the app and Voting



Isabelle is on her lunch break and realises it is election day



Isabelle remembers an email about voting and finds her log-in code



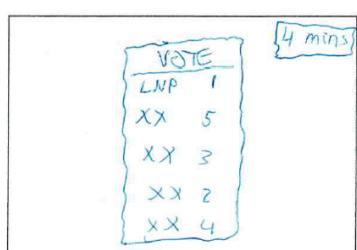
Isabelle downloads the app and logs in



Isabelle spoke to her parents last night who said they would vote LNP



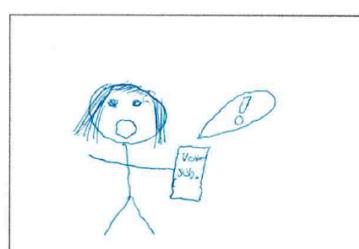
Isabelle has 5 minutes left so she taps the Vote option without reading



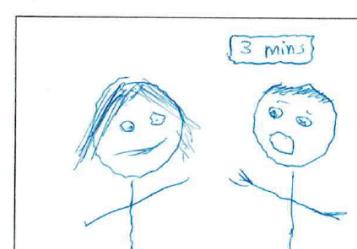
Isabelle gives LNP first preference and then randomly selects others

PERSONA: Isabelle Sommerville

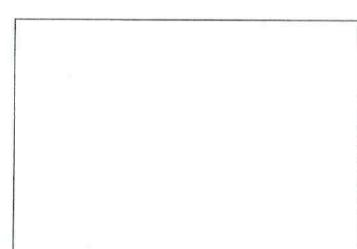
USER STORY/SCENARIO: Opening the app and Voting



Isabelle presses submit vote and immediately gets e-mail notification



Isabelle closes the app and finishes her break



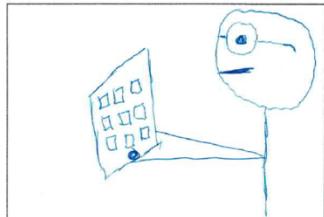
As evident by the interaction scenario above, an extremely well-educated and technically inclined user was able to interact with the system following the interaction flow. Additionally, the user was able to understand relevant metaphors and navigate to the desired voting screen without any misunderstanding. This helps understand that this type of user should be adaptable to this software so long as it has some resemblance to other mobile apps. Whilst this does not provide insight into potential issues this app could have with a user such as Isabelle, it does help understand what type of user would understand the system best in its current state.

Interaction Scenario 2 – Paul Smith

In contrast to *Interaction Scenario 1*, this scenario was designed to help empathise with a user who has little technical experience and a low education. Specifically, it was designed to look

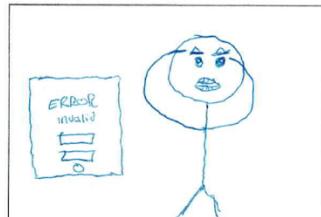
at how the presentation of candidate and party information in the app is perceived by someone not used to using mobile apps.

PERSONA: PAUL SMITH



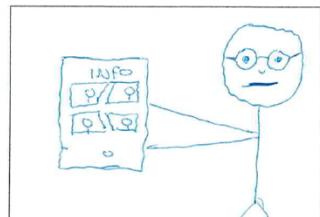
Paul unlocks his iPad and opens the eVoting Australia app.

USER STORY/SCENARIO:



Paul incorrectly puts in the unique log-in code sent to his mail.

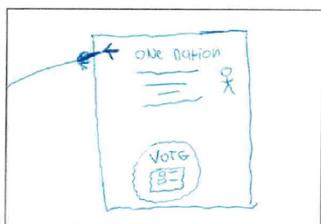
Reading candidate information after logging in



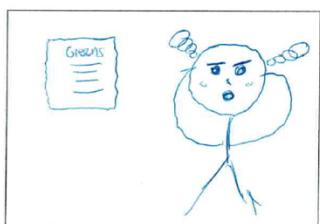
Paul logs in and finds the candidate information screen. The big pictures make it easy to see.



Paul goes straight to One Nation candidate to see if app is accurate



Even though Paul sees "Vote" button, he goes back to see other candidates

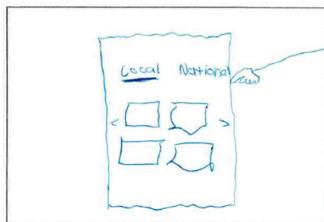


Paul reads information for the Greens and Labour and is angered by inaccuracy of what they wrote.

PERSONA: PAUL SMITH

USER STORY/SCENARIO:

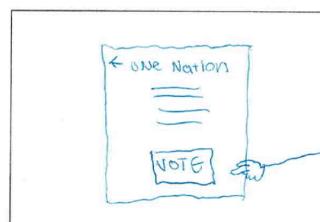
Reading candidate information after logging in



Paul goes back to candidate info screen and taps "National" tab.



Paul reads the One Nation & LNP National information



Angered by what the Greens had written, Paul taps the 'Vote' button

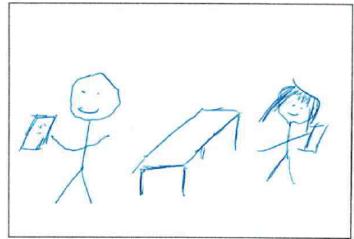
As shown by Paul's interaction with the system, the accuracy of information in the app could have a big impact on a user's experience. Since Paul has such strong political beliefs, he was able to identify biases in information written in the section, and thus whilst his vote was not changed, his overall experience of the app was affected. Therefore, it is important that the information in the app is presented in such a way that inaccuracies in candidate information does not plague a user such as Paul's experience using the system. Furthermore, the card-based metaphors in the home screen were designed with the premise of making items as clear as possible, and this scenario outlines there use for people of an older demographic.

Interaction Scenario 3 – Nathan Hill

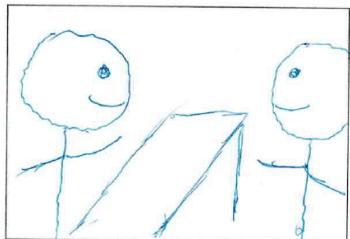
This interaction scenario was designed to help understand how a typical user would use the system to view candidates and vote. As stated in the *Personas* section of the report, the typical Australian votes for the same party of the majority of the time. The only time this is impacted is if one party has done exceedingly well or exceedingly poorly. Unlike a user such as Paul, whilst Nathan believes a certain party best represents his political beliefs, he is still open to discussion regarding who to vote for.

PERSONA: NATHAN HILL

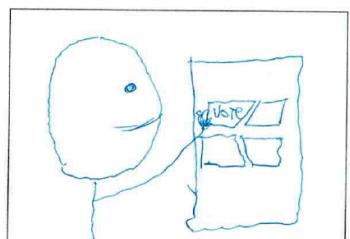
USER STORY/SCENARIO: Voting After viewing candidates



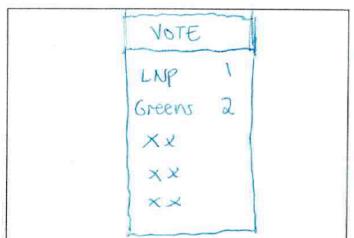
Nathan has just finished reading the information of candidates while Voting with his wife at home



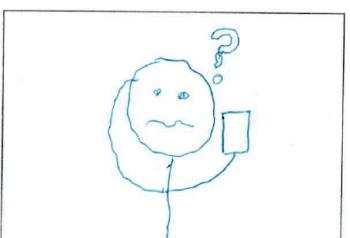
They talk about the different policies and agree to vote differently



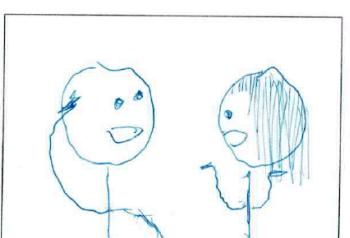
Nathan enters the voting Screen from the main menu



Nathan puts LNP as his first preference and Greens as his second



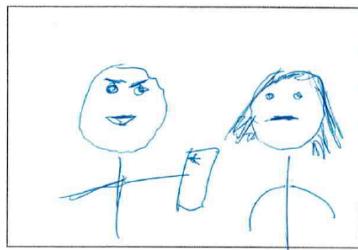
Nathan forgets the key policies about the other candidates



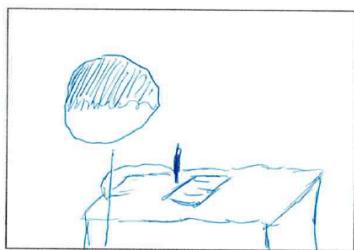
Nathan asks his wife Who else had good policy

PERSONA: NATHAN HILL

USER STORY/SCENARIO: Voting after viewing candidates



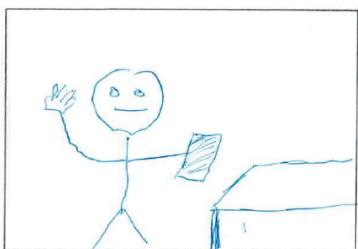
His wife also cannot remember, so Nathan annoyingly goes back to candidate screen



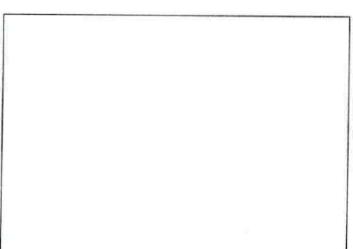
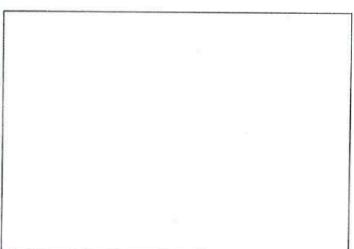
Nathan reads information of other candidates and writes down his preferences on a piece of paper



Nathan enters the voting screen and re-enters his preferences



Nathan hits submit and closes his phone.



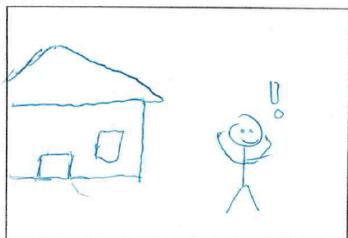
As shown by the scenario above, Nathan utilised the information section of the app to encourage discussion with his wife regarding policies. This is an aspect of the app that completely changes traditional ‘secret’ voting methods, and thus must be considered since some may find it to impeach on their right for a secret ballot. Additionally, this scenario helps identify the possible memory limitations many users may have when using the system to vote based on the information provided. A lot of information is accessible very quickly for users, and thus it could definitely be possible for people to forget what decisions they have made. Thus, the next iteration of the system should have some way to re-navigate to the candidate information screen without losing saved voting preferences in order to prevent the scenario that occurs with Nathan where he has to resort to using pen and paper. It cannot be an expectation that the user will remember up to six names and order them without forgetting, and thus this is a key design flaw that needs to be revised.

Interaction Scenario 4 –Paul Smith

The aims of this interaction were to look at how a user represented by Paul Smith would understand the metaphors used in the app. Specifically, Paul interacts with the system by trying to update his profile settings due to a change in address.

PERSONA: PAUL SMITH

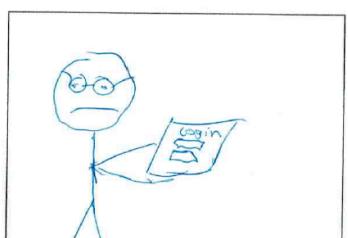
USER STORY/SCENARIO: Updates address in profile settings



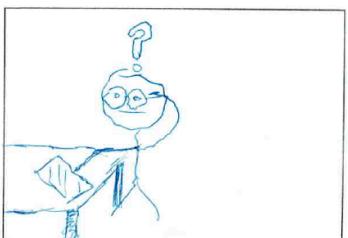
Paul has finally moved house after 45 years and realises he must update it for elections



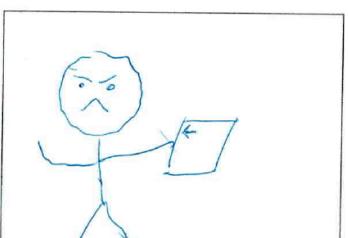
Paul calls the electoral committee who inform him this is done on voting app



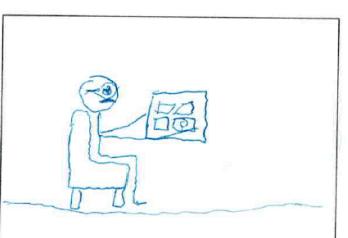
Paul opens voting app and logs in with email and code saved to his phone



Paul is confused where to go and hits settings icon



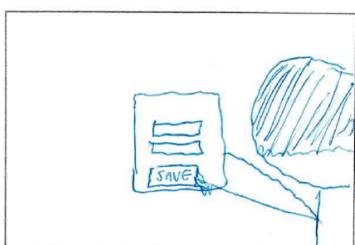
Unable to find what he is after, Paul leaves the Settings page annoyed



Paul tries the profile icon and sees the address option

PERSONA: PAUL SMITH

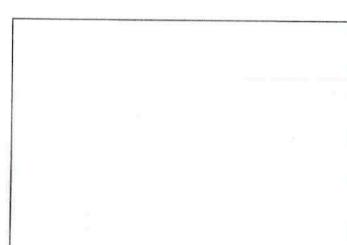
USER STORY/SCENARIO: Updates address in profile settings



Paul types in his new address and presses the save button



Paul closes his iPad and swear technology makes things harder

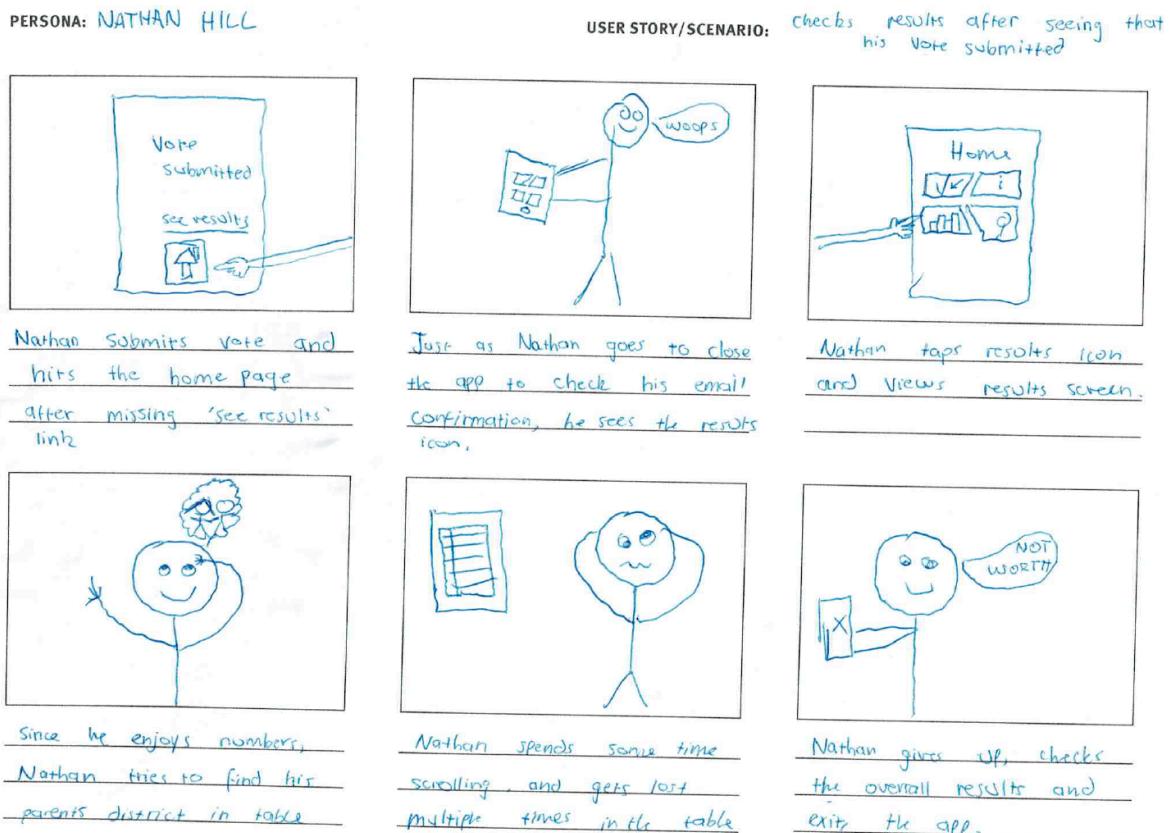


It can be seen from this scenario that users with less technical experience may not be familiar with what certain pages are expected to contain. For example, those familiar with mobile apps are aware that the settings page generally alters things such as font, size and colour, whereas the profile option alters personal information. However, an understanding of different metaphors and what they represent is not intuitive for people who have not been exposed to technology and has been evident throughout the current evaluations done. Thus, a task which may seem simple to a typical user may be a much more difficult experience for others. Thus, in order to help a user like Paul Smith interact with the system, there needs to be some form of guidance. This is generally implemented with a to-do list, and helps the user understand what

they need to do in order to reach the end-goal. Whilst most users may find this painful, it is of great value to those less familiar with mobile apps.

Interaction Scenario 5 –Nathan Hill

This scenario looks at the possible flaws in the current results section of the system and aims to understand how a typical user would understand the data. Whilst Nathan is defined as a typical user, his experiences with numbers and data due to his occupation should have had some impact on his interaction with the app. However, as shown in the scenario below, the current way data is displayed is over-complicated and very hard for a user to understand. This has been explicated in numerous interviews and questionnaires so far. In order to help simplify the screen so a typical user can better understand results, it is important to identify what information is most important and would actually be viewed by a majority of users. The current problem that Nathan experienced is that there was no easy way to navigate to a desired section. For most people the app is designed to be a quicker and more convenient alternative to traditional voting, and any unessential time-consuming process would lead to them closing the app and giving up. Thus, the use of cards and surveying people about what data would be most important to them is a way to make this interaction scenario go as planned.



UX Goals

Table 2 below comprises of a list of UX goals that have been based on previous interviews and evaluation session with users. Additionally, the new system requirements are based upon more specific feedback from participants as well as from information drawn from the interaction scenarios and low fidelity analysis conducted previously. The aim of the UX goals is to create high-level objectives in terms of anticipated user experience. These will be then be used as a basis for the development of the medium fidelity prototype found in the *Medium Fidelity Prototype* section of the report.

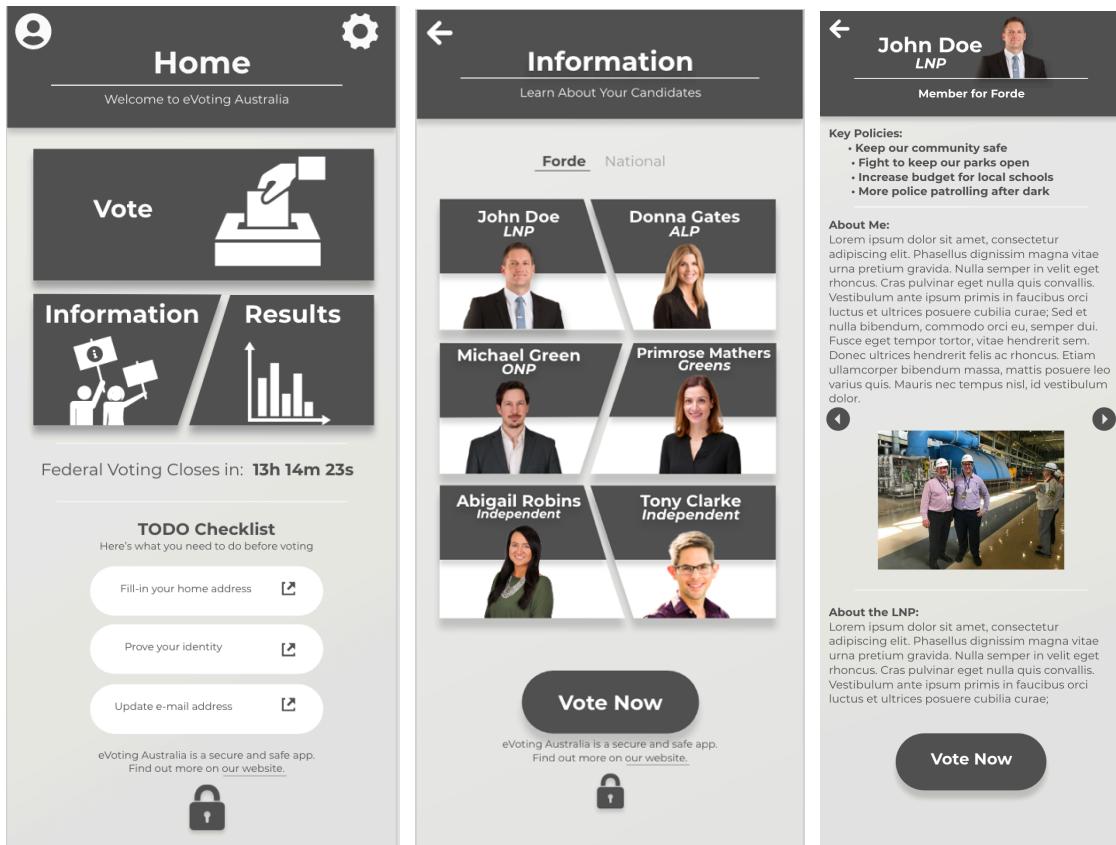
Source	UX Goal	Measures	Requirements
Design Walkthrough Participant 3: “ <i>Looking at the info screen of John Doe, it would be really annoying to go back and press another person every time. I would want to get through the pages as quickly as possible if it were me</i> ”	I want to easily swipe between different candidate pages so that I can quickly read information that is important to me.	Number of clicks on links for: 1. Back button on candidate page 2. Side scrolling arrows on candidate page Survey questions: 1. “I was able to quickly change between candidate information pages” 2. “It was painful navigating between candidate information pages” (negative scoring) Customer interviews Direct observation in a controlled environment	- Swiping functionality on each candidate page - Clear left/right arrows on side of each candidate page to show the user they can navigate - Distinct back button on each page - Relevant candidate information and images
Co-design Participant 1: “ <i>I think it would be really easy to forget the order of your preferences without there being a way re-visit the candidates while voting.</i> ”	I want to learn about different candidates while voting so that I don't forget important information.	Number of clicks on links for: 1. Candidates in the voting screen Survey questions: 1. “I was able to access the candidate information I needed while in the voting screen” 2. “The voting screen did not easily allow me to view candidate information” (negative scoring) Customer interviews	- Relevant candidate information - Interactive candidate options in voting screen that when tapped open information page - Distinct back button at top of candidate information page
Design Walkthrough Participant 5: “ <i>If I were to vote I would definitely want to be able to see the results of the election as soon as I have voted just to see if I was with the majority. I think it also would make me feel like I've had more of an impact than just hearing about it later.</i> ”	I want to see the live results of the election after I have voted to determine whether people agree with me and to see who is in the lead.	Number of clicks on links for: 1. See results button after vote is submitted 2. Results menu icon in home screen Time spent on: 1. Results screen after vote is submitted Survey questions: 1. “The results screen was easy to find after voting” 2. “The results screen quickly showed me the	- ‘See Results’ function - Pie chart showing the results for the overall election - Geographic map showing what areas are voting for certain parties - Tab that allows user to switch across to their district - Link to further results via a card menu item

		important information I was looking for" Customer interviews	- General overview saying who is in the lead
Design Walkthrough Participant 4: “Also, being able to vote at any point of reading the information of different people would be very useful for people who forget things easily.”	I want to vote as soon as I have found a candidate that I like so that I don't forget who I want to vote for.	<p>Number of clicks on links for:</p> <ol style="list-style-type: none"> 1. ‘Vote Now’ button on a specific candidate page 2. Vote button on candidate overview page 3. Candidates in the voting screen <p>Survey questions:</p> <ol style="list-style-type: none"> 1. “Once I found my ideal candidate, I was easily able to start the voting process” 2. “By the time I started voting I had forgotten the candidate information I used to help me decide” <p>Customer interviews Direct observation in a controlled environment</p>	<ul style="list-style-type: none"> - Distinct ‘Vote Now’ button on each candidate/party information page - Vote button with relevant voting metaphor on main information page - Relevant image, name, and party of each candidate on the voting screen - Numbered boxes positioned next to each candidate name for user to order
Co-design Participant 1: “It definitely is a really useful feature to be able to see everyone you’re voting for. I think it would really help educate voters which is needed at the moment.”	I want to learn more about the candidates running in the election as well as the party they are representing to determine who to vote for.	<p>Number of clicks on links for:</p> <ol style="list-style-type: none"> 1. Candidates 2. Candidate icon in home menu <p>Time spent on:</p> <ol style="list-style-type: none"> 1. Candidate page <p>Survey questions:</p> <ol style="list-style-type: none"> 1. “I learnt enough about each candidate to make an informed decision” 2. “I did not feel knowledgeable enough to make an educated vote” (negative scoring) 3. “The information on the candidate page was fair for all parties” <p>Customer interviews</p>	<ul style="list-style-type: none"> - Selectable card menu item for each candidate in information page - Relevant images, names and party affiliation of candidates located in card menu item - General overview of the candidate’s policies and belief - Brief description of their party and what they stand for - Relevant image of the candidate and their party at the top of candidate’s page
Design Walkthrough Post Interaction Survey: Would you ever use this system in the future? why/why not? <ul style="list-style-type: none"> - “It would have to be secure but yes” - “Yes, assuming it worked and was secure” 	I want to know the app is secure so that I can trust that my vote will remain private and anonymous	<p>Survey questions:</p> <ol style="list-style-type: none"> 1. “I felt as if the app was safe and that I could trust it with my data” 2. “I would not trust this app with my personal details” (negative scoring) <p>Customer interviews</p>	<ul style="list-style-type: none"> - Link to website that explains to the user how the system works - Relevant metaphors (secure lock etc.) on voting screen - Log-in functionality - Lock closing animation after successful log-in

- “Yes, but security is key”			
Co-design Participant 4: “When I think of election results, I just think of the country. I don’t know if most people would care about the other areas so much. Keep it simple I reckon.”	I want to see the results of the country and my division without seeing unrelated areas in order to understand the results of what is most important to me	<p>Time spent on:</p> <ol style="list-style-type: none"> 1. Results screen 2. ‘More results’ page of results screen <p>Survey questions:</p> <ol style="list-style-type: none"> 1. “I found the results screen to clearly show me the information most important to me” 2. “There was information on the results screen that I did not care about” 3. “The results screen was easy to understand” 4. “The graphs on the results screen were the most effective way to show the data” <p>Customer interviews</p>	<ul style="list-style-type: none"> - Relevant graphs pertaining to current national results - Scrollable carousel of graphs showing important information - Relevant headings for each page - Specific and clear titles of figures - Customisable graph options in settings (such as colour, size)
Co-design Participant 5: “When I think of other apps, I feel like the whole processes of confirmation is done automatically. It’s like a receipt, we all should get one and if someone forgets which I would, it could be bad.”	I want to have proof that I have voted so that I have ease of mind knowing I will not be fined and that my vote will count.	<p>Survey questions:</p> <ol style="list-style-type: none"> 1. “I felt confident that my vote had submitted without fault” 2. “The automatic email message made me feel confident I had voted correctly” <p>Customer interviews</p>	<ul style="list-style-type: none"> - Ballot sheet entering ballot box metaphor after submit button pressed - Specific text telling user a confirmation email has been sent to their address - Large text on screen saying ‘Vote Submitted’ - Navigation options for results and home page
TAM Respondent 1: “The only thing I noticed lacking was that there were no reminders for anything, which would have made it easier. For example, something to tell me that I needed to update my address or email. Although they’re pretty small things, they’d make a big difference and I’d expect them to be there.”	I want to know whether I have done everything I need on the home page prior to voting so that I don't get punished	<p>Number of clicks on:</p> <ol style="list-style-type: none"> 1. Voting screen when pre-voting steps are incomplete <p>Survey questions:</p> <ol style="list-style-type: none"> 1. “This page clearly showed me what steps I needed to do before voting” 2. “This page clearly showed me I had completed all the steps needed prior to voting” <p>Customer interviews</p>	<ul style="list-style-type: none"> - List on homepage with tasks required of user - Each task is a link that takes user straight to relevant section of profile - Once an item is completed, removed from list of to-dos - If list is empty, replaced with text telling user they have no outstanding tasks - Profile page - Settings page with link to profile page

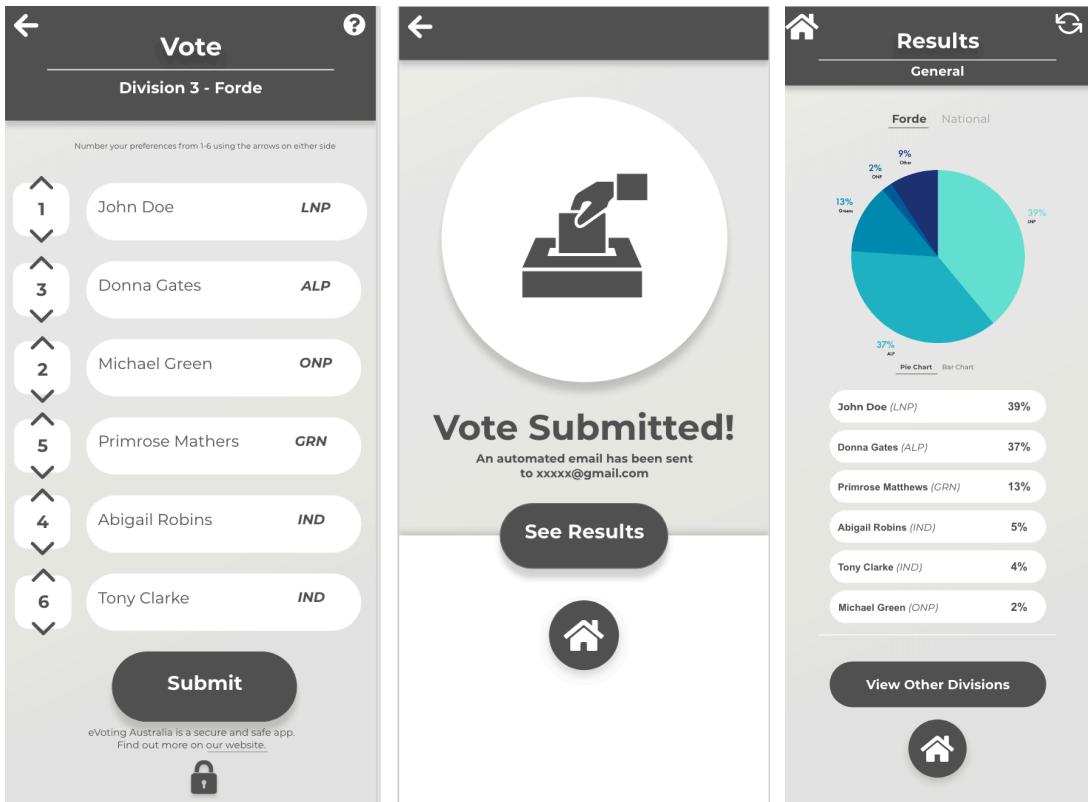
<p>Co-Design Participant 2: <i>“There is no way of knowing whether there is an election on, which I’d say is important since people don’t really pay enough attention to know what day they have to vote.”</i></p>	<p>I want to know when I need to vote on the home page so that I don't have to remember myself.</p>	<p>Number of clicks on:</p> <ol style="list-style-type: none"> 1. Voting screen when it is not an election day <p>Survey questions:</p> <ol style="list-style-type: none"> 1. “This page made it obvious that I was required to vote today” <p>Customer interviews</p>	<ul style="list-style-type: none"> - Large heading text on home page informing user of whether voting is open - If voting closed, text shows the next election and time until voting opens
---	---	--	--

Medium Fidelity Prototype



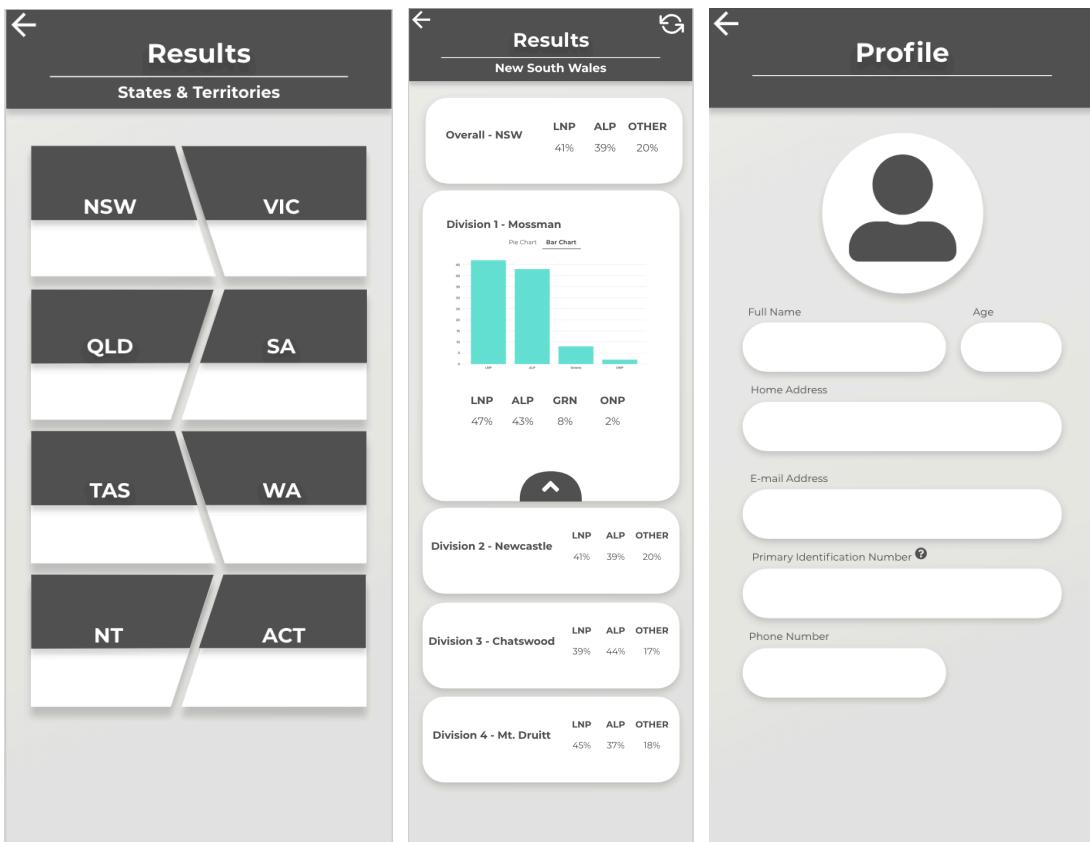
Home Screen, Information Screen and a typical Candidate Screen

The first three screens shown are representative of the home page as well as the pages that aim to provide the user with key information regarding election candidates. As shown in the home screen, the use of metaphors for menu icons makes it clear to the user where each button navigates to. Furthermore, each section of the home page is divided in such a way that the user is not confused about any associations between elements. The countdown is also clear and is positioned at the centre of the screen, making it very hard for a user to miss. The information page uses large menu buttons with clear text to give the user a clear glimpse of candidates and acts as an aid to guide users to read more about them. Additionally, the *Vote Now* button on the information page allows users to skip straight to the voting process if they feel like they have sufficient information. Finally, the John Doe page is representative of a typical candidate page and uses distinct arrows to indicate to a user that they can change between people. Furthermore, the large back button at the top of this page enables those less familiar with the ‘swiping’ functionality to navigate through the various candidates.



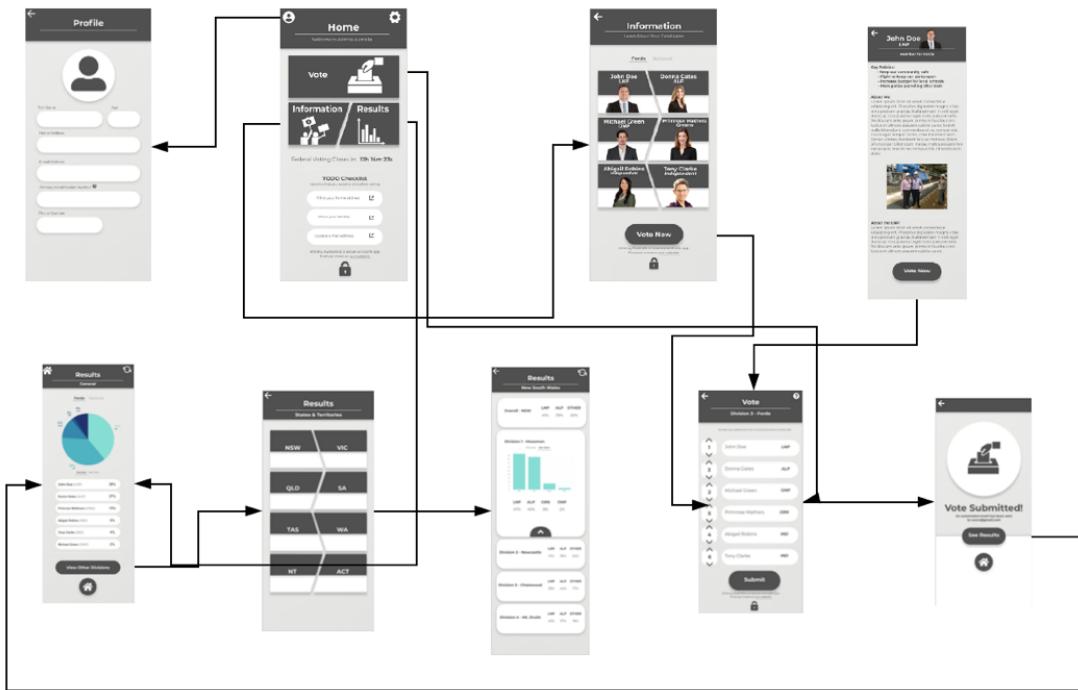
Voting Screen, Vote Submitted Screen and the main Results Screen

The next set of screens pertain to the voting functionality of the system as well as the main results page. The voting screen aims to show the user important information about each candidate (name and party affiliation), in order to aid their short-term memory from reading the candidate screen. However, as was found to be a problem with the low-fidelity prototype, user cognition needed further aid and thus each name is very clearly a pressable button that guides the user back to the relevant candidate page. The vote submitted page uses the ballot metaphor to clearly indicate to the user that they have completed the task. Furthermore, the page was designed with minimalism in mind in order to ensure the user is aware that they have voted correctly. Finally, the results page aims to use a minimalist layout to show the user the most important information to them. It was found in the previous evaluation that users were interested in knowing whether their opinions lied with the majority, and this screen aims to show them this information clearly. Furthermore, users were most interested in the overall results, with no user saying that they would spend the time looking at the results of other divisions. Thus, if a user wishes to see more divisions, there is a distinct button to guide them there, but the main results page is designed to show an overview of the election scores. The colour of this button matches all other main navigation buttons throughout the app, which is a common theme that aims to utilise the Gestalt Principle of similarity. Additionally, there is a clear tab option for the user to change between graph types on this screen.



State & Territories Results Screen, NSW Results Screen and Profile Screen

The further results screens show how the user would navigate to find additional information. The states & territories screen uses a familiar menu layout, and is designed to make the navigation process as simple as possible. The results screen following this menu aims to use card-based metaphors so that the user is not overloaded with a large amount of unimportant information. As shown by this screen, once the user taps on a division, then they are able to view a brief overview of the results. The profile screen is where users can edit and update their information. It is designed to resemble the profile page of most prolific apps. There is also a help button on the identification number button, which aims to help those unfamiliar with the system.



Revised interaction flow of the system

As shown above, the revised interaction flow of the system shows how a user can interact with the system. This was amended from the previous iteration by adding more navigation options to make the app more appealing to a diverse range of users. Initially, the low-fidelity prototype was very limited in navigation options, which had a particularly negative impact on users with more technical experience. Younger users generally didn't like being made to go through multiple screens to reach the voting page. Consequently, more buttons were added to the system to give users more freedom. Whilst more buttons were added, the system is still fairly simple and intuitive, and does not rely on past experiences and guesses to navigate, thus appealing to a typical user.

Medium Fidelity Prototype Evaluation

System Usability Scale (SUS)

The first method chosen to evaluate the medium fidelity prototype was the System Usability Scale (SUS) technique. This method measures the perceptions of usability and was originally created to be a “quick and dirty” way of assessing a system’s usability (Sauro, 2011). Specifically, SUS provides a global measure of overall system satisfaction as well as clearly measuring both learnability and usability dimensions. Consequently, it is possible to track and report both of these dimensions as well as the global SUS score. SUS is also useful on relatively small sample sizes, which means that it is not as time and resource intensive as other methods. As a result, SUS has been selected as it provides meaningful, quantitative data pertaining to the usability of the system, and it correlates highly with other questionnaire-based measurements which will allow for a complete analysis.

Despite the many positive aspects of SUS, there are some drawbacks with the method. The complex scoring system of SUS can be quite difficult to interpret, and thus the use of effective visualisations is essential. Additionally, since a SUS score is not a percentage, one's

interpretation of the result can be distorted. In fact, the average system would score 68% and not 50% using SUS (Sauro, 2011). SUS is also not a diagnostic tool, which means that whilst a poor SUS score may indicate a problem with a part of the system, it does not identify what that problem may be. As a result, it will be essential to use other evaluation methods such as Think Aloud in order to draw substantiated conclusions about the current state of the system.

In an ideal situation, SUS is conducted in-person after setting a protocol that instructs users to perform a set of tasks that interact with the system. However, due to current circumstances, these sessions were run via *Zoom* and utilised a shareable *Adobe XD* link of the medium fidelity prototype. The desired interaction flow was set in *Adobe XD*, which meant that users were able to navigate the prototype as if it were a functioning app. Despite sufficient functionality using *Zoom*, it was limiting since it was not possible to clearly see respondent's reactions to questions whilst also sharing their screen.

The protocol for the SUS evaluation aimed to set tasks based on key pieces of functionality that users would interact with most often. Much like for the low-fidelity prototype evaluation sessions, these were identified to be the information page, voting page, and results page. The main difference between the protocol defined for SUS and one's used in the last iteration is that the changes made to the system had to also be tested. This meant setting slightly different tasks in order to elicit appropriate feedback. First, the users were asked to navigate to the John Doe information page, where they were then set the task of finding his page from the vote screen before submitting their vote. Finally, the new results section of the app was tested by asking users to navigate to the NSW results. This was found to be a diverse set of tasks that consequently exposed as much of the system as possible given the time and technology constraints. Following these tasks, the SUS survey was handed out and in response to the questionnaire, users were asked a series of follow-up questions based on their answers. Figure 6 below shows the individual results of each question of the SUS survey, based on responses from 7 diverse participants.

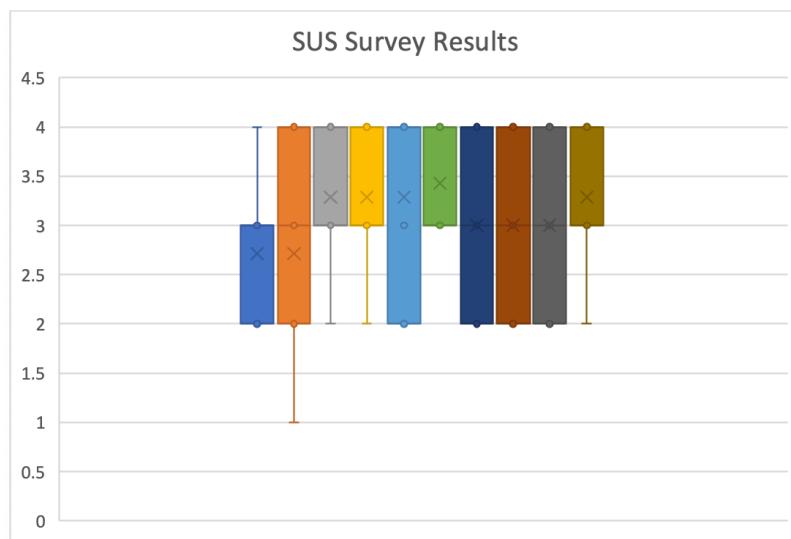


Figure 7: Results of each SUS question

When first looking at the results, it is clear that the spread of data is fairly consistent across all questions, with the majority of respondents scoring on average above 75% (or a 'B' score). Additionally, it is important to note that all questions scored above 2.714 (see *SUS Evaluation Results* section of appendix), which when equating to percentages places these results at above

70%. What this indicates is that overall respondents had sound interactions with the system and its usability and learnability were of a satisfactory level. Despite the positive overall trends in the data, there are small inconsistencies in the results that indicate certain issues pertaining to different user groups, and these will thus be analysed comprehensively in conjunction with the follow-up survey results.

The first inconsistency that is explicated by Figure 6 is the lower whisker in question 2. This question asked the respondents whether they found the system unnecessarily complex. Respondent 3 agreed with this statement, whilst all other respondents were either neutral, disagreed, or strongly disagreed with the statement. In comparison to other respondents, Respondent 3 was of an older age group and a lower socioeconomic status. When likening respondents to the personas made in the *Revised Requirements* section, this respondent would best be represented by Paul Smith, who signified a non-typical user of the system. Consequently, their interactions with the system were inevitably going to be different than those of a typical user, since their technological background as well as their ability to learn is less than most people's. When asked why they found the system to be unnecessarily complex, the respondent answered that they believed the results section had too many pages to get to what they wanted, and that the amount of information provided about candidates was too much for most people. However, other questions in the survey suggest that Respondent 3 had some conflicting opinions about the system. When asked whether they found the system easy to use, Respondent 3 agreed, and when asked if they thought most people would learn to use the system quickly, Respondent 3 also agreed. The latter of these answers is very interesting considering both this statement and the one where they explicated the system's complexity essentially contradict one another. Both statements aim to investigate the learnability of the system, and from the responses it is clear that Respondent 3 has contradicting beliefs. When asked to elaborate on their response in regard to question 7, the respondent answered that whilst they found the system to be overly complex and hard to learn, they found the app easier than most they had used previously and understood that their lack of experience with technology probably put them at a disadvantage. This is interesting since the respondent's hypothesis was relatively accurate, since the learnability scores of the system were very high overall, and the respondents belonging to the typical user group as well as the younger, more technologically inclined users found the system to be very simple to navigate. Thus, whilst the comments made about the system's complexity by Respondent 3 indicate a potential problem with the design, their acknowledgement of their own technical ability implies that further evaluation must be conducted on users of a diverse range to determine whether changes should be made.

Looking at Figure 6, the middle quartile of responses for statement 1, which considered whether they would use the system frequently, is lower than all other responses. When most users were asked to justify their responses, there was however some confusion about what the question implied. Of the seven recorded responses, four of those answered lower than normal because they identified that elections are not frequent and therefore there would be no reason to use the system outside of election time. The other respondents perceived the word frequently to mean every election, and consequently all either agreed or strongly agreed with the statement. In order to get a better gage of whether people would in fact use the system frequently, this question was redefined in the post-interaction questionnaire and instead users were specifically asked whether they would use the system for every election. The results of this question were overwhelmingly positive, with all but one respondent saying they would undoubtedly use this system so long as it worked as shown in the prototype. The only respondent who was uncertain was Respondent 6 who justified their response by saying that they don't like the idea of using technology to perform such an important and private task.

Respondent 6 would fall into a user group best represented by the typical user, however had an obvious scepticism towards the technology. Thus, since they are best described as a typical user, these comments need to be taken with substantial weight. If this distrust is present in a portion of typical users, then this could well hinder the success of the app. Thus, whilst it is unclear whether the security lock metaphor had any effect, various aspects of the design will need to be looked at further in order to help satisfy users concerned about their privacy.

Respondent 4 provided interesting results, despite not being explicitly represented in the spread of data shown in Figure 6. Despite belonging to the upper end of users, whereby Respondent 4 is highly educated and technologically inclined (See Isabelle Sommerville persona in *Revised Requirements* section), they found both the usability and learnability of the system to be low, with their overall grade being 57.5% or a C on the grade scale. This is significantly lower than other scores and implies that the notion that this type of user would find the system the simplest to follow may be flawed. Most interestingly, the respondent consistently responded neutrally to both positive and negative statements, which implies that whilst they did not find anything particularly easy, they also didn't find anything about the system extremely difficult. When asked to justify their answers, the respondent stated that "*compared to other apps it wasn't as intuitive and some of the features were redundant*". When asked to specify what part of the system in particular made them feel this way, the respondent explicated that the checklist on the homepage was unnecessarily large and that the results were not displayed as effectively as they should have been. This is interesting given the user's high-level of education in the technology field, and definitely provides expert insight into areas of the system that need refining. Whilst certainly not a typical user, Respondent 4 is able to provide a greater depth of technical feedback that other users can't. Thus, whilst this provides great insight, these features were all unnoticed by other participants. Consequently, the expectations of this respondent may have been different given their technical knowledge on the subject, and thus the two features they identified to have issues will be tested further with typical users in the next evaluation section. It is however interesting that both the highly educated and lower educated participants both identified the same issues with the results page. This definitely suggests that regardless of previous experiences with data, the way the app currently used graphs could be optimised further to ensure that all users are more satisfied. Respondent 4 proposed the use of a heatmap as well as more customisable graph options, and thus should definitely be taken into consideration. Additionally, users with higher levels of education will most likely be some of the users most interested in the data produced from the election, and thus their opinions are of great value.

Whilst the SUS results have provided an overview of user's opinions regarding the usability of the app, more qualitative analysis must be conducted to try and narrow down more specific issues with the system. Additionally, whilst some users of the SUS survey provided specific examples that justified their beliefs, not enough feedback was provided to justify changing key features of the system. However, following the next phase of evaluations, there will be a better idea into whether changes must be made in the next iteration of the app.

Think Aloud & Time on Task

The second and final evaluation method being used to analyse the medium fidelity prototype is a combination of Think Aloud and Time on Task. Both of these techniques provide a completely different sets of data and help reach justified conclusions regarding the system's design and usability. Think Aloud is a process in which users verbalise their thoughts, feelings, and opinions while interacting with the system (Nielsen, 2012). In particular, it is an effective way to hear their misconceptions, which generally turn into actionable redesign

recommendations since when multiple users misinterpret design elements, it is generally a strong indicator to alter them (Nielsen, 2012). Additionally, it is a cheap, high-quality way to gain qualitative feedback, and any errors can be clarified with meaningful dialogue. As a result, the majority of issues can generally be found in a system from a small sample size. Another key and interesting about Think Aloud is that the expert also partakes in a session, and provides feedback on their own system, which can expose issue that otherwise may have gone unseen.

Time on Task is an evaluation method whereby a repeatable protocol is defined, and a user is timed to complete a certain task. In particular, a user is measured on their average task completion time, mean time to failure, and their average time on task (Nielsen, 2012). Consequently, it is easy to gain meaningful and understandable quantitative data that identifies usability problems as well as the learnability of the system. Generally, Time on Task would utilise the same protocol as Think Aloud but would be run in completely different sessions. This is because Think Aloud generally has a direct impact on Time on Task, since users are often distracted by verbalising their thoughts and are thus unable to complete a task at normal pace. However, due to the current situation and limitations of *Zoom*, both of the methods have been combined into one protocol. In order to assist with the limitations of combining both techniques, users will be evaluated at the end of a session to help determine whether their results have been impacted. This should at least help distinguish accurate data that can be confidently used in further analysis to help improve the design of the system. Another disadvantage of this evaluation method is that it can be complex to undertake for both the experimenter and participant, and thus a clearly defined protocol must be set with a simple but relevant task that does not overload the user's cognitive ability. Also, due to the time-consuming nature of this hybrid evaluation technique, a small sample size will be used, which may impact the ability to test a diverse range of users. However, to overcome this, users that best fit the different persona groups defined in the *Revised Requirements* section will be identified in order to draw meaningful and relatable conclusions.

The protocol that was set for participants involved the use of *Zoom* and *Adobe XD*, where they were instructed to view the results of NSW from the home screen. This was decided to be an appropriate task due to the results of the SUS evaluation conducted in the previous section which implied that the interaction flow of the results section could be refined further. During each of the three times through the task, users were asked to express their thoughts as they went along and were told not to worry whether they sounded 'smart' or if their comments were relevant. This decision was to ensure that users were not filtering their thoughts to sound more intelligent, as the purpose of the evaluation technique is to elicit raw responses to the system. After the evaluation session was conducted, users were then given a set of questions to help expand on their thoughts and provide more elaborate details into potential flaws in the design.

The outcome of the evaluation indicate that the results section of the system has many flaws that were reflected in both qualitative and quantitative data. Firstly, the results of the Think Aloud process produced interesting responses pertaining to the layout of menus, graphs, and pages. In order to synthesis these responses, an affinity diagram has been used to group common issues into themes.

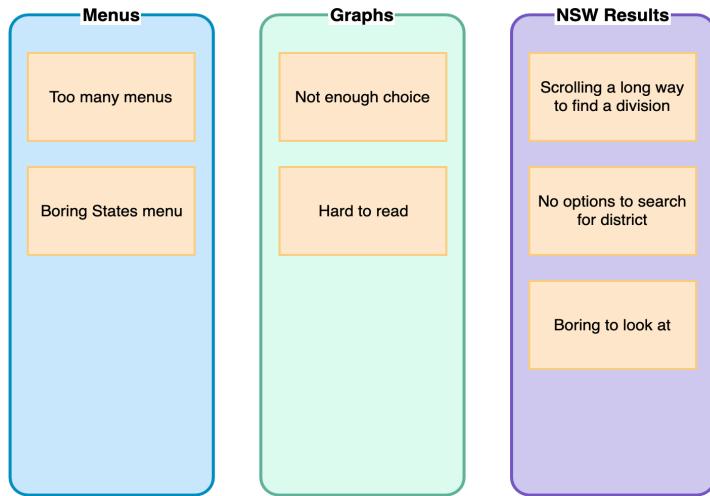


Figure 8: Affinity diagram of participant thoughts during session

As seen in Figure 7, the menus screen was problematic for some users, with the words boring and excessive being used to describe their appearance. Specifically, one user had difficulty understanding why there was so many menus to navigate through to get to something as important as state results. Additionally, this same user found the menus in this section to be rather dull and uninspiring. Given that this respondent fits the typical user category, it is important to consider their feedback. Additionally, the layout of menus has already been raised as a problem in the previous section, and thus is clearly an issue for users of multiple backgrounds. This can also be seen in the results explicated by Figure 8, which records the time taken for users to navigate to the page over three attempts. The significant difference between times in the first attempt and supplementary attempts indicates that users did not find the navigation options intuitive at first. Additionally, the fact that it took participants nearly 7 seconds on average to navigate the menus implies that the current interaction flow is not serving the intended purpose of assisting users complete the tasks quicker. This can also be seen when comparing the data recorded from respondents 1-4 alongside those from Respondent 5, who represented the expert familiar with the system. It was clear that once a user was familiar with the interaction, they were all consistent in their times regardless of what user group they represented. However, the nature of the app must be considered, and realistically users will only interact with the app at most three times every three years (for all government levels), and thus will probably forget the interaction flow of the system. As a result, it can be expected that the times representing a user's first attempt are a more accurate representation of what the typical user would experience. Thus, it is essential that the interaction flow of the results section is restructured to remove redundant menus in order to increase the usability of the system. This could potentially be achieved through the implementation of a geographical map to navigate different divisions, which is commonly used in apps containing large amounts of data (Gerrow-Wilcox, 2017).

Time to reach NSW results page from home screen

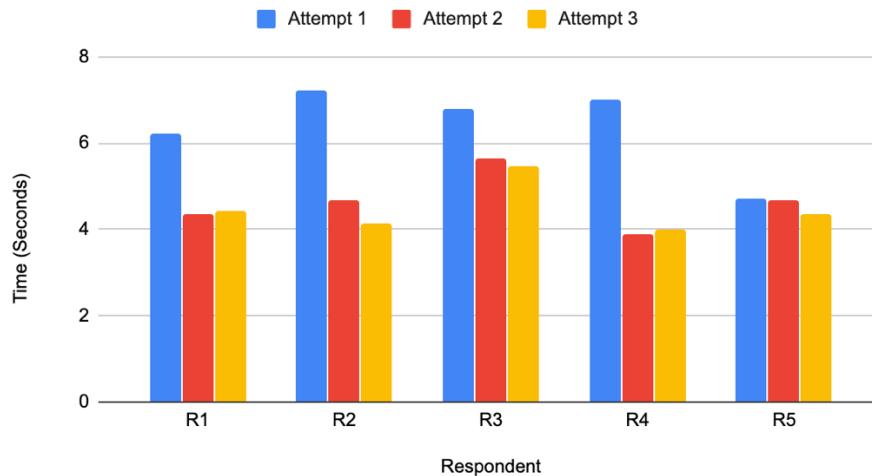


Figure 9: Time to reach NSW results page from home screen

The affinity diagram in Figure 7 also identifies current issues with how data is being visualised in the results page. Out of the four participants, two found the graphs hard to read at a glance. When asked in the post-interaction questionnaire to justify their thoughts, one of the participants belonging to the typical user group stated that they believed the graphs needed to have more customisable features to make the data easier to understand. The other user explicated their concern that it was hard to read the small text given their poor eyesight, and that they had no way of knowing how many votes had been cast. In regard to customisable features, 55% of all Australians have one or more long-term eye conditions (AIHW, 2019). As a result, it is essential that users have the option to adjust text and figure size in order to make the data accessible. This issue has been a common theme amongst users in the typical user group and older age brackets, and must be addressed since it potentially affects such a large portion of people interacting with the app. The comment made by the previous respondent about not being able to see the number of votes casted also pointed out an error in the design of the medium fidelity. The initial system requirements specified that the results screen does show this data, as it was found from survey responses that users wanted to know this information. However, this was neglected and thus needs to be incorporated back into the system in the next iteration in order to satisfy user needs.

The lack of a search feature in the results page was also noted as an issue by a user with a higher technical background than other participants. They identified that the time it took to navigate the vast menus could have been reduced if they could have just searched for what they needed. This is an interesting idea that is used in many apps that utilise large amounts of data. This feature, if used correctly, would also remove the issue of people having to scroll so far to find the information they require that they end up quitting the app. It would also reduce the need for excessive menus if implemented correctly but would rely on user knowledge of Australia to know what they want to see. It is not fair to assume that the typical user would have this knowledge, and thus a search bar must still complement some form of menu system. It is also interesting to note from Figure 8, that despite the technical background of Respondent 4, their times were almost identical to participants with much less experience using technology. This reiterates the need for additional features such as a search bar to simplify the process for and consequently reduce the time for higher-level users.

Finally, due to the evaluation session incorporating a hybrid of techniques, users were asked at the end of each session if they believed their results for the Time on Task were impacted by the inclusion of Think Aloud. Of the four users interviewed, all of them disagreed that they were impacted, since they did not immediately voice concerns that distracted them from the task. Thus, the results obtained in this section are a fair representation of a user's experience and can be used to aid in further refining system requirements.

High Fidelity Prototype

Revised Requirements

The medium fidelity prototype evaluation provided deep insight into some of the flaws identified with the system. The next step of the design process is to revise the requirements of the system and add information about the user, their needs and values. In order to effectively achieve this, the impact on the conceptual design due to the revised design must be explored.

Revised Problem Statement

Design and develop an application to be used on mobile devices that allows people to vote from anywhere on election day, and provides equal opportunities for parties and candidates to present their policies to voters, as well as providing a way of tracking the current status of the election at multiple levels and keeping voting secure to ensure election results are not tampered with.

Revised High-Level Description of System

The eVoting Australia system will:

- Allow all registered voters to choose their candidate preferences and vote on election day.
- Provide the user with all the relevant information regarding individual party candidates and general party policy to make an informed decision.
- Track the current state of an election and display real-time national results as well as results most relevant to a user based on their location.
- Allow a user to search for results by state, division name or through a geographical map
- Allow a user to uniquely identify themselves using an identification number.
- Alert a user when they are required to vote.
- Inform the user of any upcoming elections
- Help users navigate through the complex voting system in Australia.
- Enable users to customise aspects of their profile including profile image, address and telephone number.
- Remind users to perform any required tasks prior to voting.
- Allow users to customise graphs based on their preferred visualisation method
- Allow users to search for results of any division or district

Additional Interface Metaphors

Based on feedback from the SUS evaluation session, it was identified that the current checklist feature is too complex for most viewers and all of the tasks displayed link to the same profile page. Consequently, it has been decided that in order to overcome this, a simple navigation button will be used on the home screen that clearly tells a user that there is an issue. Finally, on the profile page, an exclamation mark metaphor will be used to alert users of sections that require completion. This process ensures that users are not overloaded with information on the

home page and prevents them from performing repetitive processes in order to complete the required tasks. Thus, Figure 10 will be used on the home page to draw the user's attention to the outstanding tasks and will be used at the start of each profile section that requires completion. This will very clearly relate the alert from the home page to the relevant profile section and will prevent confusion once the user has reached the profile screen. This feature is very commonly implemented on other apps that require personal information, including PayPal and Facebook.



Figure 10: Red exclamation mark used to alert user of outstanding tasks

Revised System Requirements

Voting on Election Day

Secondary Level Feature

Key interface needs to replicate a typical ballot paper as much as possible

Rationale

Voting will be used by all members of the public on a given election day despite their technical backgrounds.

Notes

Person may have never had experience using technology, and since voting is meant to be in private, people are not able to assist someone at the time of voting. Also, people may be overwhelmed with information at the time of voting after hearing or reading campaigns. Therefore, the voting screen needs to have the minimum amount of content and allows people to follow a familiar method. The use of metaphors and direct feedback are essential for this feature. In countries where voting is not compulsory, a simple process would help boost voting turnout, with online voting projected to increase youth turnout by 26% (Chowdhury, Viral Voting, 2014).

Campaigning via the App

Secondary Level Feature

There must be equal opportunities for parties to summarise their campaign on the app in order to remove bias.

Rationale

The user may miss certain parties campaign points if not correctly laid out due to lack of time or knowledge of where to look.

Notes

The design of the campaign page must be a grid and fit on one screen so all parties can be viewed without scrolling. Parties should be easily identified so people can click what they want since 93% of people already know who they are voting for prior to the election (Fowler, 2013). The person should not feel obliged to read all party policies; therefore, information shouldn't

be presented unless a party is clicked by a user. Information should be clear and concise and contain information about a member and the party as a whole. Also, users need to be able to re-visit campaign information whilst in the voting screen so that they do not rely too heavily on their long-term memory.

Displaying Real-Time Results

Secondary Level Feature

Results interface needs a clear way of displaying data that is customizable for each user based on their past experiences.

Rationale

The electoral system is very complex, and a lot of different results are of interest to voters, therefore information needs to be laid out simply and allow people to see what results interest them.

Notes

The average voter would be most interested in the overall result of the election, so that should be the default graph. There should also be an option to see different division results that display the same graph. As shown in the research section, having instant results would remove the week-long period in most countries where votes are being counted and there is no governing body. Additionally, it has become more apparent that users desire as much freedom as possible, and consequently want the option to change the graph type. The most common and readable graph types used for this screen will be the pie graph, heat map and bar graph. Finally, the results feature will have a search functionality to allow users to quickly find divisions or areas that most interest them. This will save a more knowledgeable user time when interacting with the app, which is a large aspect of the appeal of the app. Whilst this feature will be available, users will still have the ability to search for results through a menu system, since many users will be less familiar with the Australian voting system.

Securely Manage User Data

Secondary Level Feature

Research indicates security to be the primary concern for users, so the app must handle data in a way to eliminate risks of cyber-attacks.

Rationale

Voters will not use the system if it is not secure, and if results were tampered with then repercussions would be detrimental at national scale.

Notes

The system must be able to store and encrypt data in such a way the cyber-attacks are minimised. According to a survey conducted in the research phase, only 54% of people trust current technology (Smith M. , 2015). The only way this can be increased is through trials of the system that prove its capability. Without this underlying feature, the app's usability is non-existent and irrelevant. Additionally, the use of a secure trust badge within the app will help remind users of the security measure implemented, which previously effected the willingness to use the system of 60% of all survey respondents.

Customise Profile Information

Secondary Level Feature

Users must be able to edit key profile features including their address and telephone number in order to ensure the electoral committee can easily track changes in personal information.

Rationale

Voters will be reluctant to use the system if they are still required to use a different website or fill in a form to notify the government of changes in key details.

Notes

The system will incorporate a simple interface that easily allows users to securely update their basic information. This information will be stored in a database that tracks the contact details of voters. Users will be reminded that their details are secured on this screen through the use of the lock interface metaphor, and a small description allowing users to read more about specific security features. Also, the profile page will be structured similar to other prolific apps in order to aid the cognition of users familiar with other mobile apps. Finally, the use of colour and an exclamation mark metaphor (see figure XX) will be used to alert users of any outstanding tasks on the profile page.

Revised UX Goals

Source	UX Goal	Measures	Requirements
Design Walkthrough Participant 3: “ <i>Looking at the info screen of John Doe, it would be really annoying to go back and press another person every time. I would want to get through the pages as quickly as possible if it were me</i> ”	I want to easily swipe between different candidate pages so that I can quickly read information that is important to me.	Number of clicks on links for: 1. Back button on candidate page 2. Side scrolling arrows on candidate page Survey questions: 1. “I was able to quickly change between candidate information pages” 2. “It was painful navigating between candidate information pages” (negative scoring) Customer interviews Direct observation in a controlled environment	- Swiping functionality on each candidate page - Clear left/right arrows on side of each candidate page to show the user they can navigate - Distinct back button on each page - Relevant candidate information and images
Co-design Participant 1: “ <i>I think it would be really easy to forget the order of your preferences without there being a way re-visit the candidates while voting.</i> ”	I want to learn about different candidates while voting so that I don't forget important information.	Number of clicks on links for: 1. Candidates in the voting screen Survey questions: 1. “I was able to access the candidate information I needed while in the voting screen” 2. “The voting screen did not easily allow me to view candidate information” (negative scoring) Customer interviews	- Relevant candidate information - Interactive candidate options in voting screen that when tapped open information page - Distinct back button at top of candidate information page
Design Walkthrough Participant 5: “ <i>If I were to vote I would definitely want</i>	I want to see the live results of the election after I	Number of clicks on links for: 1. See results button after vote is submitted	- ‘See Results’ function

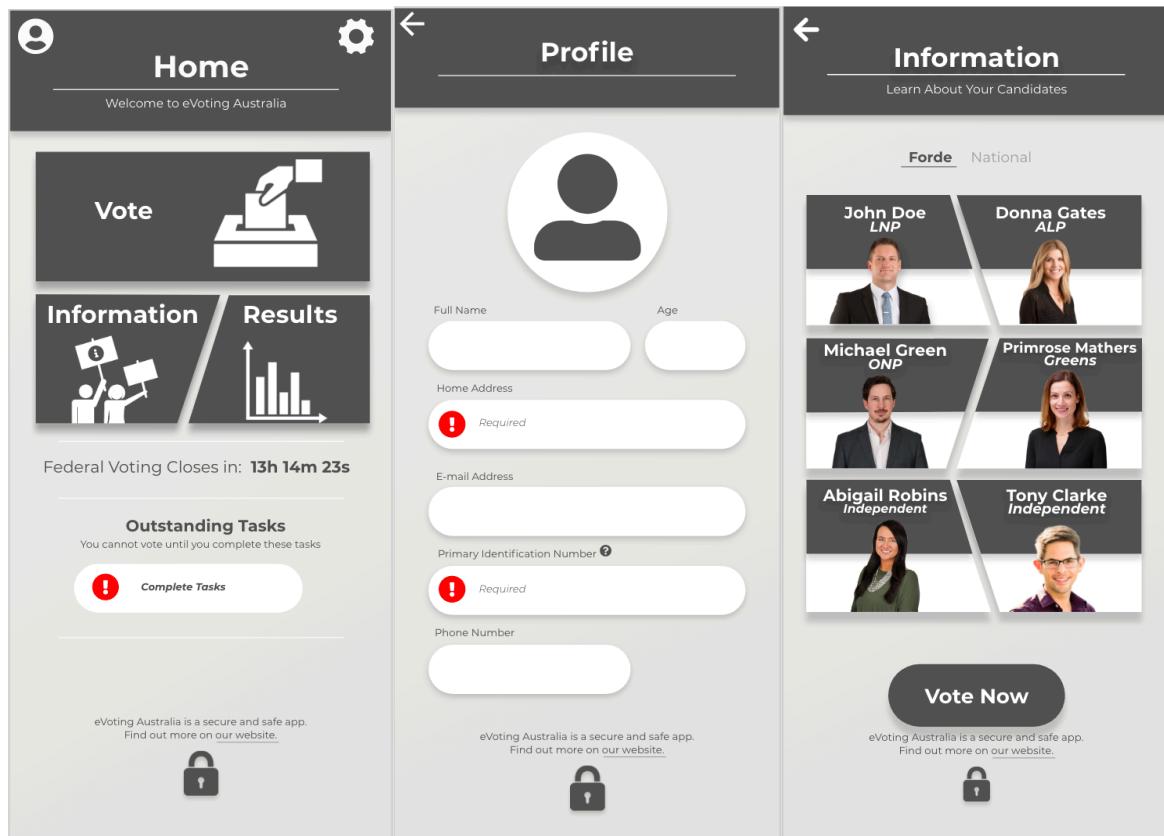
<p><i>to be able to see the results of the election as soon as I have voted just to see if I was with the majority. I think it also would make me feel like I've had more of an impact than just hearing about it later.</i></p>	<p>have voted to determine whether people agree with me and to see who is in the lead.</p>	<p>2. Results menu icon in home screen Time spent on: 1. Results screen after vote is submitted Survey questions: 1. "The results screen was easy to find after voting" 2. "The results screen quickly showed me the important information I was looking for" Customer interviews</p>	<ul style="list-style-type: none"> - Pie chart showing the results for the overall election - Geographic map showing what areas are voting for certain parties that can be interacted with. - Bar chart to see how parties/candidates are ranking comparatively. - Tab that allows user to switch across to their district - Link to further results via a card menu item - General overview saying who is in the lead - Search functionality for results pages
<p>Design Walkthrough Participant 4: <i>"Also, being able to vote at any point of reading the information of different people would be very useful for people who forget things easily."</i></p> <p>Design Walkthrough Participant 5: <i>"It was nice that I could go straight from the candidate to vote. If there was actually stuff on the page, I wouldn't forget it"</i></p>	<p>I want to vote as soon as I have found a candidate that I like so that I don't forget who I want to vote for.</p>	<p>Number of clicks on links for: 1. 'Vote Now' button on a specific candidate page 2. Vote button on candidate overview page 3. Candidates in the voting screen Survey questions: 1. "Once I found my ideal candidate, I was easily able to start the voting process" 2. "By the time I started voting I had forgotten the candidate information I used to help me decide" Customer interviews Direct observation in a controlled environment</p>	<ul style="list-style-type: none"> - Distinct 'Vote Now' button on each candidate/party information page - Vote button with relevant voting metaphor on main information page - Relevant image, name, and party of each candidate on the voting screen - Numbered boxes positioned next to each candidate name for user to order
<p>Co-design Participant 1: <i>"It definitely is a really useful feature to be able to see everyone you're voting for. I think it would really help educate voters which is needed at the moment."</i></p>	<p>I want to learn more about the candidates running in the election as well as the party they are representing to determine who to vote for.</p>	<p>Number of clicks on links for: 1. Candidates 2. Candidate icon in home menu Time spent on: 1. Candidate page Survey questions: 1. "I learnt enough about each candidate to make an informed decision" 2. "I did not feel knowledgeable enough to</p>	<ul style="list-style-type: none"> - Selectable card menu item for each candidate in information page - Relevant images, names and party affiliation of candidates located in card menu item - General overview of the candidate's policies and belief

		<p>make an educated vote” (negative scoring)</p> <p>3. “The information on the candidate page was fair for all parties”</p> <p>Customer interviews</p>	<ul style="list-style-type: none"> - Brief description of their party and what they stand for - Relevant image of the candidate and their party at the top of candidate’s page
<p>Design Walkthrough Post Interaction Survey: Would you ever use this system in the future? why/why not?</p> <ul style="list-style-type: none"> - “It would have to be secure but yes” - “Yes, assuming it worked and was secure” - “Yes, but security is key” 	<p>I want to know the app is secure so that I can trust that my vote will remain private and anonymous</p>	<p>Survey questions:</p> <ol style="list-style-type: none"> 1. “I felt as if the app was safe and that I could trust it with my data” 2. “I would not trust this app with my personal details” (negative scoring) <p>Customer interviews</p>	<ul style="list-style-type: none"> - Link to website that explains to the user how the system works - Relevant metaphors (secure lock etc.) on voting screen - Log-in functionality - Lock closing animation after successful log-in
<p>Co-design Participant 4: “When I think of election results, I just think of the country. I don’t know if most people would care about the other areas so much. Keep it simple I reckon.”</p>	<p>I want to see the results of the country and my division without seeing unrelated areas in order to understand the results of what is most important to me</p>	<p>Time spent on:</p> <ol style="list-style-type: none"> 1. Results screen 2. ‘More results’ page of results screen <p>Survey questions:</p> <ol style="list-style-type: none"> 1. “I found the results screen to clearly show me the information most important to me” 2. “There was information on the results screen that I did not care about” 3. “The results screen was easy to understand” 4. “The graphs on the results screen were the most effective way to show the data” <p>Customer interviews</p>	<ul style="list-style-type: none"> - Relevant graphs pertaining to current national results - Scrollable carousel of graphs showing important information - Relevant headings for each page - Specific and clear titles of figures - Customisable graph options in settings (such as colour, size) - Additional searching functionality to keep the main page as simple as possible
<p>Co-design Participant 5: “When I think of other apps, I feel like the whole processes of confirmation is done automatically. It’s like a receipt, we all should get one and if someone forgets- which I would, it could be bad.”</p>	<p>I want to have proof that I have voted so that I have ease of mind knowing I will not be fined and that my vote will count.</p>	<p>Survey questions:</p> <ol style="list-style-type: none"> 1. “I felt confident that my vote had submitted without fault” 2. “The automatic email message made me feel confident I had voted correctly” <p>Customer interviews</p>	<ul style="list-style-type: none"> - Ballot sheet entering ballot box metaphor after submit button pressed - Specific text telling user a conformation email has been sent to their address - Large text on screen saying ‘Vote Submitted’ - Navigation options for results and home page

<p>TAM Respondent 1: “<i>The only thing I noticed lacking was that there were no reminders for anything, which would have made it easier. For example, something to tell me that I needed to update my address or email. Although they’re pretty small things, they’d make a big difference and I’d expect them to be there.</i>”</p> <p>SUS Participant 34 <i>“The checklist on the homepage there is three different ways of telling you to go to the profile. That is unnecessarily large.”</i></p>	<p>I want to know whether I have done everything I need on the home page prior to voting so that I don’t get punished</p>	<p>Number of clicks on:</p> <ol style="list-style-type: none"> 1. Voting screen when pre-voting steps are incomplete <p>Survey questions:</p> <ol style="list-style-type: none"> 1. “This page clearly showed me what steps I needed to do before voting” 2. “This page clearly showed me I had completed all the steps needed prior to voting” <p>Customer interviews</p>	<ul style="list-style-type: none"> - Alert on the homepage telling user there is an outstanding task - Alert takes user to the profile page - Each outstanding task on the profile page is shown with a red exclamation mark - Exclamation mark visible on home page - Once an item is completed, exclamation mark is removed - In no outstanding tasks, then user can vote and no alerts - Profile page - Settings page with link to profile page
<p>Co-Design Participant 2: “<i>There is no way of knowing whether there is an election on, which I’d say is important since people don’t really pay enough attention to know what day they have to vote.</i>”</p>	<p>I want to know when I need to vote on the home page so that I don’t have to remember myself.</p>	<p>Number of clicks on:</p> <ol style="list-style-type: none"> 1. Voting screen when it is not an election day <p>Survey questions:</p> <ol style="list-style-type: none"> 1. “This page made it obvious that I was required to vote today” <p>Customer interviews</p>	<ul style="list-style-type: none"> - Large heading text on home page informing user of whether voting is open - If voting closed, text shows the next election and time until voting opens
<p>Time on Task Participant 4: “<i>It definitely needed a search bar or map to look for divisions. It’s very time consuming and preventable to make people scroll for ten seconds to find a small heading.</i>”</p> <p>Time on Task Participant 3: “<i>Like I said to you the first time I think it was, you would need to scroll a lot and it could be a bit more interesting.</i>”</p> <p>SUS Respondent 3: “<i>Your result section is far too complicated; you don’t need that many pages to click through</i>”</p>	<p>I want to be able to see the results I want as fast as possible so that I don’t have to waste time scrolling through large amounts of irrelevant information.</p>	<p>Number of clicks on:</p> <ol style="list-style-type: none"> 1. Search bar feature 2. Menu options <p>Survey questions:</p> <ol style="list-style-type: none"> 1. “The search bar made it easier for me to find results” 2. “I would use the search bar before I used the menu options” <p>Customer interviews</p>	<ul style="list-style-type: none"> - Search bar functionality on main results page - Search bar functionality on state results page - Card-based menu items displaying search results - Distinct search icon

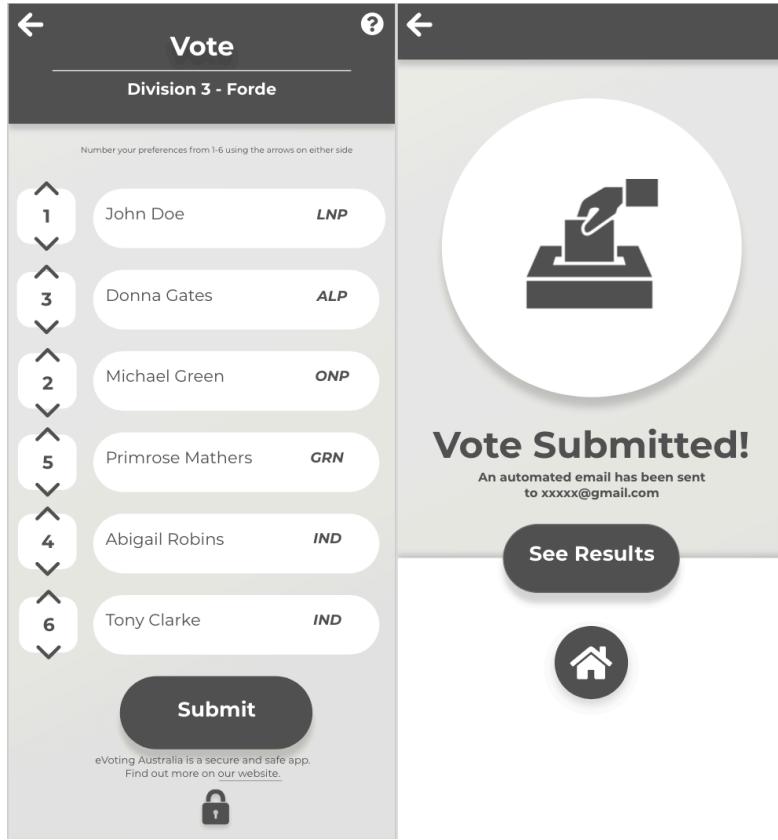
High Fidelity Prototype

In addition to the figures in this report, a link to the high-fidelity prototype can also be found at: <https://xd.adobe.com/view/0c77e38c-2f4d-4d89-61fe-bd3af0054695-7a46/>



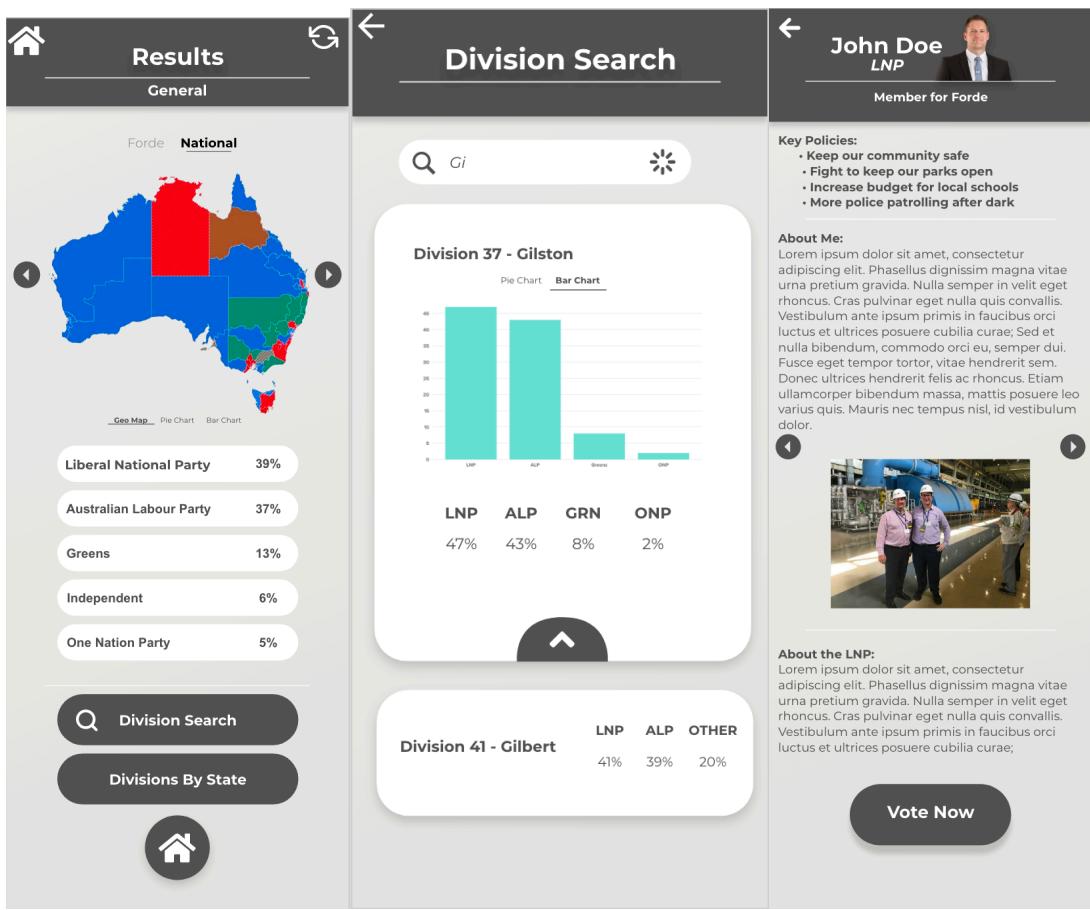
Home Screen, Profile Screen and Candidate Information Screen

Based on feedback found from the medium-fidelity prototype, the *TODO Checklist* section of the Home Screen was altered to a simple button alerting a user of any outstanding tasks. A red exclamation mark metaphor was also used to clearly show the user that they are required to fill in information. Furthermore, this exclamation mark is again used once the user reaches the profile page, and makes it very clear to the user what sections need completing prior to voting. The original checklist for the Home Screen was said to be too repetitive and all tasks led the user to the same page. Consequently, this new design aims to eliminate the redundancies and make the users experience with the system quicker and more seamless. The Information page did not receive sufficient feedback from any medium-fidelity prototype evaluation sessions, and thus was not altered.



Voting Screen and the Vote Submitted Screen

The design of the voting screen as well as the vote submitted screen for the high-fidelity prototype are the same as the versions shown in the medium-fidelity prototype. This is because the responses from the SUS evaluation sessions tended to identify flaws in the designs of the results screen and the home screen. Additionally, the Think Aloud sessions aimed to get more information pertaining to the results screen of the app. Consequently, whilst there was no constructive feedback regarding either of these pages in the last design iteration, the high-fidelity prototype evaluation will aim to address them. Some comments made by respondents did however commend the design of the voting page, calling it “intuitive” and “resembling a typical ballot page”. This is a strong sign that the intended metaphor of this screen is working as expected.



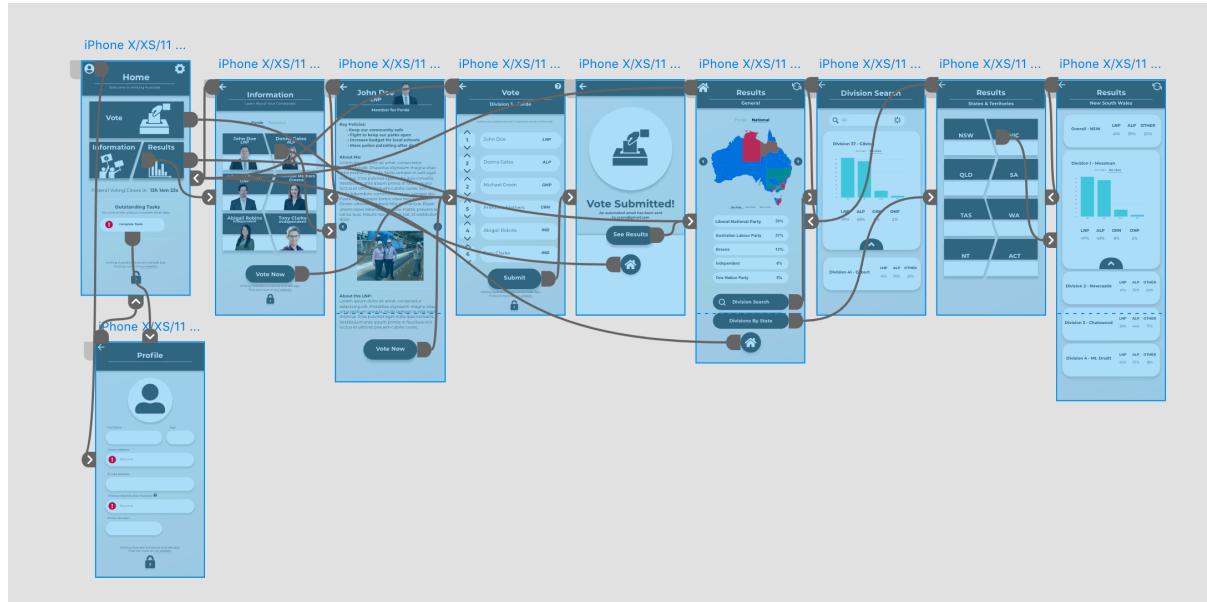
Results Screen, Division Search Screen and the John Doe Candidate Information Screen

As stated previously, the results screen received the most feedback during the medium-fidelity evaluation stage, and consequently had the most changes in the revised conceptual model. The first screen shown is the main results page, and now has a geographical map as an additional figure. This geographical map is also designed to be a navigation tool where a user can press a state to navigate to those results. This feature is in line with feedback received in the Think Aloud sessions, where users complained of the unnecessarily long navigation process required to see further results. This feature was not removed completely however, but was instead addressed through the addition of the geographic map. Furthermore, a search button was added to the main results page with the intention of reducing search times for users, since it was found that the previous menu system was unnecessarily complex. This page utilises card-based metaphors to display the information in a distinguishable manner that does not overload the short term memory of a user. Finally, the John Doe page was not altered from the previous iteration since there was limited feedback pertaining to this feature.



States & Territories Results Screen and NSW Results Screen

Whilst the layout of the further results pages received some critical feedback in previous evaluation sessions, it was decided that it should remain as an additional feature to give the user more control over the navigation flow. Consequently, the only alteration to the further results page was a search bar, which aimed to make the process quicker for users with a specific division in mind. As stated in the revised conceptual model, many users may not have a profound knowledge of the Australian voting system, and consequently additional options are required to ensure the system is learnable for a diverse range of people.



Revised interaction flow of the system

Whilst the majority of the interaction flow remains unchanged from the medium-fidelity prototype, the addition of the searching functionality on multiple results screen can be seen in this figure. Specifically, it shows how these features add more choice for a user, which from feedback was found to be an issue that needed addressing. In addition to the search functionality, the simplicity of the new *Outstanding Tasks* option in the home page is explicated in this figure.

High Fidelity Prototype Evaluation

Heuristic Evaluation

A heuristic evaluation is a usability engineering method that helps find usability problems in a user interface design (Nielsen, 1994). Furthermore, it ideally requires five or more experts within the UX and UI domain to evaluate a system alongside a set of recognised usability principles. These principles are universal to all heuristic evaluations, however as technology has changed so too have some of their variants. Consequently, the set of heuristic principles that will be tested alongside the normal heuristic principles are the SMART heuristics, which are as follows (Dobbins, 2020):

- Provide immediate notification of application status.
- Use a theme and consistent terms, as well as conventions and standards familiar to user.
- Prevent problems where possible; help users if problem occurs, including with network.
- Display an overlay pointing out main features when appropriate or requested to help first-time users.
- Each interface should focus on one task, so that it's glanceable to users who are interrupted frequently.
- Design a visually pleasing interface. Users 'forgive' attractive interfaces.
- Intuitive interfaces make for easier learning
- Design a clear navigable path to task completion
- Allow configuration options and shortcuts.
- Cater for diverse mobile environments (lighting, ambient noise, gloves, etc).
- Facilitate easier input by displaying keyboard buttons that are as large as possible, supporting, multimodal input, and keeping form fields to a minimum.

- Use camera, microphone and sensors to lessen user's workload (e.g. GPS so the user knows where they are and how to get where they need to go)

A key reason for using the heuristic evaluation method is that the use of experts has fewer ethical and practical issues when compared to using a typical user (Dobbins, 2020). Furthermore, experts have a greater knowledge of application domain and usability and consequently will tend to identify more issues than a common end-user. Having said this, the extended knowledge of experts can also cause false alarms when identifying problems, and consequently it is important to couple the heuristic evaluation method with additional methods. Additionally, it is important to test at least five users, since it has been found that this number will generally result in 75% of all usability issues being found (Nielsen, 1994). Thus, using fewer than this number may result in an incomplete evaluation which could result in key usability issues going unnoticed.

A heuristic evaluation is performed by having each separate evaluator inspect the interface alone. It is ideal to encourage an expert to interact with the system for approximately 20 minutes before starting to look at the heuristic principles. It is essential to have experts conduct these sessions alone in order to ensure that all evaluations are independent and unbiased (Nielsen, 1994). Due to social distancing regulations, these sessions were conducted through email and other messaging services. All participants were sent a protocol as well as a copy of the heuristic principles (see the *Appendix*) to assist them with the session. There was no set time limit, however each protocol asked the expert to try and spend 20 minutes familiarising themselves with the system. Whilst this would have been much easier to control in a face-to-face context, all participants stated that they complied with the protocol. Furthermore, each participant was asked to record each issue's frequency, impact, and persistence on a four-point scale in order to determine how urgent it was to rectify the problem. The results from the heuristic evaluation session can be seen below:

Screen/Element Description	Usability Issue	Heuristic Category	Probable Effect On User	Impact	Frequency	Persistence
First Using App	Lack of tutorial screen or help icons. Since voting has a range of user age and technical abilities, should have a maybe an initial tutorial screen showing how and what the UI elements are and do. Or have help icons that are interactable throughout the entire voting process.	Help & Documentation	Can't continue or struggle with voting.	High	Common	Very
Settings Language	Since voters can contain a range of	User Control & Freedom	If English not spoken/read	High	Rare	Very

	individuals in society where people have different languages for speaking and reading. Should coincide with Nielsen's usability principle of inclusivity by allowing language changes.		language not possible to continue.			
Personal Details entry fields	When entering data for personal information, Android/IOS design guidelines include error trapping methods to reduce errors when entering data. This includes minimizing text entry fields, should explore use of drop-down elements for age. As well as faded examples of other fields such as email, PIN, home address and phone number.	Error Prevention	Struggle to input information, give up if not able to enter correct field.	High	Rare	Not
Navigating back to home page	Even though home page is accessible from any page, it is not always visible to the user. When on the results page the home icon is available which is good, however every other page has a back button. From Neilson's usability principles it important for users to be able to return to the home page without difficulty, a	Consistency & Standards	Confused or overwhelmed if not able to return to the home page.	Low	Common	Very

	back button is less intuitive than a home icon.					
Font	Looking at guidelines for IOS and Android design the standard font is San Francisco for IOS and Roboto for Android. Should stick to one of these for design guideline coincidence.	Consistency & Standards	Doesn't feel like other apps	Low	Common	Very
App Icon	Lacking application icon, important for user retainability and recognition of the name of the app. Should be designed, since important for users first opinion on application.	Consistency & Standards	Might not use app	High	Common	Very
Usability Settings	Lack of options for those with disabilities and/or impairments	User Control & Freedom	Those with disabilities disadvantages when using the app	High	Rare	Not
Font	Font doesn't appear to match guidelines	Consistency & Standards	Not consistent and noticeable	Low	Common	Very
Notifications	No notifications to alert user of vote time	Provide immediate notification of application status.	People will not remember when to use the app	High	Common	Very
Language	Doesn't include diversity of cultures	User Control & Freedom	Many non-english speakers	High	Rare	Very
Results Screen	Text could be larger	Consistency and standards	Not customisable for those with poor eyesight	Low	Rare	Very
Help Icons	No information displayed	Intuitive interfaces make	User's with less experience may	Low	Rare	Very

		for easier learning	struggle without detailed help screen			
Colour	No options to alter colours to night mode	Consistency and standards	Disadvantages a certain user group	Med	Rare	Very
Voting	Buttons to change preferences of candidates could be more profound and space apart	User control and freedom	Makes it hard to vote for candidates	Med	Common	Not Very
Candidate Information	Text is not justified	Consistency and standards	User annoyance	Low	Common	Very
Candidate Information	No option to hide large sections of text	User control and freedom	User annoyance	Low	Common	Very
Vote Submitted Icons	I think you could make the vote submitted icon more clear at what it is achieving, as it kind of looks out of place and doesn't add much to the screen.	Consistency and standards	Confusion	Med	Common	Very
Language Options	I think there should be more options for the user to change settings such as language, because at the moment you are discounting non-English speaking users.	User Control & Freedom	Unusable for non-English speaking users	High	Rare	Very
Settings	There needs to be more options for people with disabilities, including TTS or alternate font size. Currently you have a settings icon but it doesn't outline what can be altered	User Control & Freedom	Doesn't aid people with disabilities or impairments	High	Rare	Very

Voting Page	Text below the heading is bolded whereas rest of subheadings are not	Consistency and standards	Annoyance	Low	Rare	Very
Opening App	No tutorials or pop-up information to inform the user how to use the app. This needs to be a feature since voting is such an important task and is required by the Australian public. Many users may find the app complex and therefore won't vote.	Help & Documentation	Difficulty using the app for its intended task	High	Common	Very
Font / Font Size	Font is not aligned with ios guidelines and cannot be altered in size.	Consistency and standards	Confusion / Difficulty using the app	Med	Common	Very
Map on Results Page	The map is very complicated to look at and has no indication that a user can interact with it. It probably needs some sort of labelling or a simpler design.	Aesthetic and minimalist design Intuitive interfaces make for easier learning	Confusion	Med	Common	Very
Icons	System does not have any icons or branding	Consistency and standards	Confusion	Low	Common	Very

From the information obtained from the heuristic evaluation sessions, it is clear that issues exist for both the general heuristic principles and the SMART heuristic principles. The first noticeable trend in the information from the heuristic evaluation sessions is the repetition of usability concerns for the consistency and standards heuristic. In particular, multiple experts expressed their concerns regarding the choice of font used for the app. Whilst this issue was regarded as low impact, it was still noticeable enough that it was questioned by 3/5 of all experts. Furthermore, the impact of using different a new font for a user was overlooked, with experts arguing that it would cause them confusion. Thus, to address this, the next iteration of the design would need to use the San Francisco font for IOS and Roboto font for Android. In addition to the choice of fonts, Expert 1 identified the home page navigation to be another

concern for the consistency and standards heuristic. Specifically, they argued that a lack of a home icon on different pages did not align with Nielson's usability principles, since it makes it more difficult for a user to navigate back the home page. Currently, the results pages use a back button to navigate a user back to the main screen, which could very simply be replaced with a home icon similar to the one seen on the candidate information screen. This would simplify the interaction flow for the user and would better align with a user's mental model. The lack of an app icon was another common issue found amongst experts. In terms of user retainability and recognition, an icon and its associated branding is the most important feature of an app (Gough, 2018). This was an overlooked feature in previous design iterations, and would consequently need to be incorporated into key pages such as the home page and voting page in order to enhance the usability of the app.

Another common concern amongst experts revolved around the user control and freedom heuristic. Specifically, the lack of settings and customisable features was identified to be a major issue, commonly scoring high on the impact metric. These features included language options, colour options, text-to-speech, and font options. All of these components are essential to the design of an app that aims to be used by a large number of people. Furthermore, this app was designed to be an alternative to in-person voting for people with disabilities, and consequently a lack of customisable options is detrimental to this user group. Whilst these features are high impact, they are fairly easy to overcome in future design iterations. By incorporating a clear settings tab into the app that incorporates these features, users would very easily be able to alter the UI of the app to better suit their requirements. Another option is to have users select these settings in a tutorial screen on their first use of the app. This would be beneficial since it would allow people with disabilities to optimise the usability settings prior to using the app. In addition to these concerns, experts identified the candidate information screen to be another part of the system that does not align with the control and freedom heuristic. Currently, users do not have the ability to hide large sections of text on these pages, which results in a potential overload of information and can affect their decisions when voting on the app. Consequently, the use of drop-down sections for these pages would make this page much easier to navigate for a user and would ensure that they can control the amount of information they see.

A lack of help and documentation in the app was identified as a further problem by multiple experts. Specifically, a lack of a tutorial screen was found to have high impacts on the usability of the system, since many of the metaphors and the basic interaction flow of the system were not explicitly explained. Consequently, many users with lower technical knowledge may have difficulty understanding features of the app. In order to address these concerns, a skippable tutorial walkthrough should be incorporated into the system. This would ensure that there is sufficient documentation for users who may have less experience using mobile apps. Furthermore, having more help buttons on key pages would also improve the usability of the system and would help alleviate the probable confusion of users. Expert 1 also identified personal information fields to be a potential usability issue due to possible errors caused by a lack of help from the system. This could have detrimental impacts on a user's experience with the app since these fields are required by law in order to vote in Australia (AEC, 2011). Thus, drop-down menus should be explored as a substitute for text fields, or an auto-complete system should be used that compares an input address with a database of Australian resident addresses. This would ensure that errors are handled correctly and would reduce the risk of ineligible votes caused by incorrect personal information.

In terms of the SMART heuristics criteria, there was a limited amount of feedback from the evaluation sessions. The first potential issue that was identified pointed out that no push notifications were used to alert people that they were required to vote. This was identified as a high impact problem and could result in a portion of users forgetting to use the system when they are required to. Consequently, a simple push notification system that alerts users of an upcoming election would be a suitable solution to address this heuristic category. Additionally, feedback was received regarding flaws with the learnability of the system. Specifically, it was argued by Expert 5 that the map displayed on the results page was too complex for a typical user to interact with. They suggested using labels to instruct users how to interact with the map or using a simpler design that does not overload the user with information. Furthermore, a lack of help buttons was identified to harm the learnability of the system. This could easily be amended through text bubbles that provide a basic overview of key features for the app.

The feedback obtained from the heuristic evaluation sessions provided a deeper insight into system flaws that were overlooked by a typical end user. Consequently, if further iterations of the app were to be designed, more usability issues could be addressed to better align with the general heuristics and SMART heuristics.

Cognitive Walkthrough

A cognitive walkthrough is an evaluation method that aims to identify and narrow gaps between the gulf of execution and the gulf of evaluation. In order to effectively conduct a cognitive walkthrough session, four unique questions must be asked:

- Will the user try and achieve the right outcome?
- Will the user notice that the correct action is available to them?
- Will the user recognize the action as the correct one?
- If the correct action is performed, will the user understand progress is being made towards their intended outcome?

Each of these questions aims to address a different stage in the gulf of execution and evaluation model. The first question looks at addressing the intention and action specification part of the model. Specifically, it looks at whether the system is making assumptions about a user's level of experience (Jones, 2017). The second question looks to address whether the system is giving a user too much choice, which correlates to the action specification to evaluation stage. Next, the protocol asks a user whether they recognise the action as correct to determine whether the use of language and UI elements is appropriate. Finally, the protocol aims to address the gulf of evaluation by investigating when feedback in the system is missing (Jones, 2017). If all of these factors can be identified, then in theory the gap between a user's mental model and the conceptual model of the system can be narrowed, thus enhancing the usability of the system.

In order for the cognitive walkthrough evaluation method to be most effective, it was important to involve a design expert as well as a typical user. This is to ensure that a diverse range of users are assessing the system and should result in a larger range of results. Thus, both participants were emailed a protocol sheet specifying three specific tasks that they were required to complete, as well as a list of action sequences. These aimed to replicate a typical interaction with the system, as well as testing as much functionality as possible. The tasks that were assigned for the users were to view the John Doe page, vote for candidates and to view the NSW results screen. The results of both sessions can be seen below:

Expert Cognitive Walkthrough Results

Task	Action Sequence	Will the user try and achieve the right outcome?	Will the user notice that the correct action is available to them?	Will the user recognize the action as the correct one?	If the correct action is performed, will the user understand progress is being made towards their intended outcome?	Issues
User views John Doe candidate information	Enters home screen	yes	yes	yes	yes	
	Complete required profile information	yes	yes	yes	no	Not clear that they can't continue process if not complete
	Navigate to candidate information page	yes	yes	yes	yes	
	View John Doe page	yes	yes	yes	yes	
User votes for preferred candidates	Navigate to voting page	yes	yes	yes	yes	
	Preference votes of candidates	yes	yes	yes	yes	
	Submits vote	yes	yes	yes	yes	
	Return to home page	yes	yes	yes	no	Process is complete at this point
User checks results in New South Wales	Enters results page	yes	yes	yes	yes	
	Clicks on geographical map	no	yes	yes	yes	Confusing map that is not labelled well
	Return to results page	yes	yes	yes	no	Task has been achieved at this point
	Navigate through menus to NSW results	yes	yes	yes	yes	

Typical User Cognitive Walkthrough Results

Task	Action Sequence	Will the user try and achieve the right outcome?	Will the user notice that the correct action is available to them?	Will the user recognize the action as the correct one?	If the correct action is performed, will the user understand progress is being made towards their intended outcome?	Issues
User views John Doe candidate information	Enters home screen	yes	yes	yes	yes	
	Complete required profile information	yes	yes	yes	yes	
	Navigate to candidate information page	yes	yes	yes	yes	
	View John Doe page	yes	yes	yes	yes	
User votes for preferred candidates	Navigate to voting page	yes	yes	yes	yes	
	Preference votes of candidates	yes	yes	yes	yes	
	Submits vote	yes	yes	yes	yes	
	Return to home page	yes	yes	yes	no	Doesn't naturally seem part of the process considering the other steps
User checks results in New South Wales	Enters results page	yes	yes	yes	yes	
	Clicks on geographical map	yes	no	yes	yes	You can press any point in the map and it will move to the NSW menu
	Return to results page	no	yes	yes	no	The task is complete so wouldn't do this step
	Navigate through menus to NSW results	no	yes	yes	yes	Not explicit in labelling that button will take to NSW

As is visible from the results listed above, both the expert and typical user found relatively similar flaws in the system. Firstly, the expert identified that completing required information was not seen to be required in order to continue the voting process. This identifies a gap between the user's expectations and the system feedback, since there is no explicit sign to tell the user that this process is required. Consequently, for future releases it would be important to address this by blacking out menu items until the profile information is complete. This would provide clear and immediate feedback to a user that they have outstanding tasks, consequently closing this existing gap between gulfs. Furthermore, the typical user did not identify this to be a problem, which suggests that the existing feedback (i.e. the red exclamation marks) has some effect. Thus, the new feature to be implemented could supplement existing feedback to maximise a user's understanding that an action has been performed.

Both participants found difficulty performing the various action sequences involved with the NSW results tasks. Specifically, both the expert and typical user had issues with the geographical map feature. The expert found that the feature currently made too many assumptions about a user's level of experience, which suggests a gap between the intention and action specifications stages of the model. This can be addressed by adding a small caption that explicitly tells the user that they can interact with the map to navigate to various districts. Interestingly, the typical user identified that this feature gives them too much choice, and consequently they do not make the correct decision. This furthers findings made in the *Heuristic Evaluation* section of the report and suggests that the design of the map would need to be simplified in further design iterations. Specifically, it would be important to limit the selectable components of the map to ensure that the user is not overloaded with choices. Finally, the typical user stated that the *Further Divisions* button located on the main results screen was not explicit enough, and thus they did not know that they would be taken to other states. This feedback again suggests that this button assumes too much about user knowledge, and consequently would need to be more explicit.

Whilst there was some feedback implying gaps between the gulfs of execution and evaluation, overall the cognitive walkthrough sessions suggest that the current conceptual design of the app align well with a user's mental model. In particular, the feedback regarding the voting functionality was overwhelmingly positive, which is incredibly important given the nature of the app.

Conclusion

The high-fidelity prototype evaluations involved both heuristic evaluations and cognitive walkthrough sessions. Based on the feedback from five experts from heuristic evaluation sessions, the key usability and application domain issues identified include:

- Lack of customisable settings
- No help screen for first-time users
- Incorrect font
- No app icons
- Complex geographical map on Results page

Furthermore, the cognitive walkthrough sessions provided insight from an expert and a typical user into usability issues with the system. Specifically, these sessions provided a clear understanding of the gaps between a user's mental model and the conceptual model of the system by analysing the gulfs of execution and evaluation. The following issues were identified from the cognitive walkthrough sessions:

- Complex geographical map on Results page
- Importance of updating profile information is unclear
- Unclear button to take users to State results

In following iterations, it would be essential to explore these issues further and consequently update the conceptual model of the system. This would need to be reflected in all aspects of the conceptual model, including the system requirements and UX goals. Furthermore, the app's prototype would then need to reflect these changes and further evaluations would need conducting. The most appropriate methods for future evaluations would include heuristic evaluations, cognitive walkthroughs, as well as unused evaluation techniques to ensure that different aspects of the system are being analysed.

Throughout the project the needs of a user have altered in certain aspects. For example, it was first thought that a typical user would value large amounts of information available on the app, which was reflected in the results pages in early prototypes. However, after interviews with 'typical' users as well as the creation of personas, it was clear that people were in fact less interested in the results as first thought. Thus, the system was changed to focus more on the tasks required to cast a vote.

Through multiple evaluation sessions as well as the creation of personas, the context of use for the system also evolved. Initially, the app was aimed to be used by young people with long and inflexible work hours. However, it became clear that people of an older age group with more stable jobs would also be a user group for the system due to its convenience when compared to traditional voting methods.

Bibliography

- ABC. (2017, May 6). *Number of children per family*. Retrieved from Australia's Best City: <https://www.australiasbestcity.com.au/fact/223/>
- ABS. (2010, October 8). *Shift Workers*. Retrieved from Australian Bureau of Statistics: <https://www.abs.gov.au/ausstats/abs@.nsf/featurearticlesbyCatalogue/5461A9DAE97FF759CA2578C300153388?OpenDocument>
- ABS. (2017, Jun 14). *3101.0 - Australian Demographic Statistics, Jun 2017*. Retrieved from Australian Bureau of Statistics: <https://www.abs.gov.au/AUSSTATS/abs@.nsf/featurearticlesbyCatalogue/CCF53AA000E69954CA2582570013F5C6?OpenDocument>
- AEC. (2011, January 24). *Enrolment*. Retrieved from Australian Electoral Commission: https://www.aec.gov.au/Elections/referendums/1999_Rerendum_Reports_Statistics/Enrolments.htm
- AIHW. (2019, August 30). *Eye health*. Retrieved from AIHW: <https://www.aihw.gov.au/reports/eye-health/eye-health/contents/how-common-is-visual-impairment>
- Babich, N. (2016, March 27). *Using Card-Based Design To Enhance UX*. Retrieved from UX Planet: <https://uxplanet.org/using-card-based-design-to-enhance-ux-51f965ab70cb>
- Baker, K. (2020, May 9). SUS Evaluation. (L. Wardropper, Interviewer)
- Cherry, K. (2019, August 13). *How Average IQ Scores Are Measured*. Retrieved from verywellmind: <https://www.verywellmind.com/what-is-the-average-iq-2795284>
- Chowdhury, A. (2014). *Viral Voting*. London: WebRoots Democracy.
- Chowdhury, A. (2015). *Viral Voting*. London: WebRoots Democracy.
- Clarke, A. (2020, April 11). Design Walkthrough Evaluation. (L. Wardropper, Interviewer)
- Clarke, A. (2020, April 15). TAM Evaluation. (L. Wardropper, Interviewer)
- Clarke, B. (2020, April 13). Co-design Evaluation. (L. Wardropper, Interviewer)
- Clarke, B. (2020, May 26). Cognitive Walkthrough Evaluation. (L. Wardropper, Interviewer)
- Clarke, B. (2020, May 9). SUS Evaluation. (L. Wardropper, Interviewer)
- Clarke, B. (2020, April 15). TAM Evaluation. (L. Wardropper, Interviewer)
- Dobbins, C. (2020, May 12). Evaluating Usability – “Expert” or “Non-User” Evaluations. Brisbane, Queensland, Australia.
- Doran, T. (2020, April 15). Design Walkthrough Evaluation. (L. Wardropper, Interviewer)
- Fisher, C. (2019, June 12). *Australians are less interested in news and consume less of it compared to other countries, survey finds*. Retrieved from The Conversation: <https://theconversation.com/australians-are-less-interested-in-news-and-consume-less-of-it-compared-to-other-countries-survey-finds-118333>
- Forde, M. (2020, April 14). Co-design Evaluation. (L. Wardropper, Interviewer)
- Fowler, A. (2013). Electoral and Policy Consequences of Voter Turnout: Evidence from Compulsory Voting in Australia. *Quarterly Journal of Political Science*, 159-182. Retrieved from https://projects.iq.harvard.edu/files/westminster_model_democracy/files/fowler_comulsoryvoting.pdf
- Gerron-Wilcox, K. (2017, October 17). *Strategies to Effectively Display Large Amounts of Data in Web Apps*. Retrieved from esri: <https://www.esri.com/arcgis-blog/products/data-management/mapping/strategies-to-effectively-display-large-amounts-of-data-in-web-apps/>
- Goel, T. (2009, May 20). *AN EFFECTIVE DESIGN WALKTHROUGH: A STEP TOWARDS DELIVERING THE BEST DESIGN*. Retrieved from Project Smart: <https://www.projectsmart.co.uk/an-effective-design-walkthrough-a-step-towards-delivering-the-best-design.php>

- Gonzales, B. (2020, May 25). Heuristic Evaluataion. (L. Wardropper, Interviewer)
- Gottschalk, F. (2019, January 31). *IMPACTS OF TECHNOLOGY USE ON CHILDREN: EXPLORING LITERATURE ON THE BRAIN, COGNITION AND WELL-BEING*. Retrieved from OECD:
<http://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=EDU/WKP%282019%293&docLanguage=En>
- Gough, S. (2018, May 17). *The importance of great mobile app branding*. Retrieved from APADMI: <https://www.apadmi.com/blog/the-importance-of-great-mobile-app-branding/>
- Jones, N. (2017, October 22). *How to Conduct a Cognitive Walkthrough*. Retrieved from Interaction Design Foundation: <https://www.interaction-design.org/literature/article/how-to-conduct-a-cognitive-walkthrough>
- Katakam, A. (2014, October 9). *Map: How long does voting take in your state?* Retrieved from Vox: <https://www.vox.com/2014/10/9/6951251/map-voting-time-by-state>
- Li, B. (2020, May 25). Heuristic Evaluataion. (L. Wardropper, Interviewer)
- Liu, J. (2020, May 8). SUS Evaluation. (L. Wardropper, Interviewer)
- Moore, M. (2020, April 13). Design Walkthrough Evaluation. (L. Wardropper, Interviewer)
- Moore, M. (2020, May 10). Time on Task and Think Aloud Evaluation. (L. Wardropper, Interviewer)
- Naik, N. (2020, April 15). Co-design Evaluation. (L. Wardropper, Interviewer)
- Naik, N. (2020, May 26). Cognitive Walkthrough Evaluation. (L. Wardropper, Interviewer)
- Naik, N. (2020, May 23). Heuristic Evaluataion. (L. Wardropper, Interviewer)
- Naik, N. (2020, April 15). TAM Evaluation. (L. Wardropper, Interviewer)
- Nielsen, J. (2012, January 15). *Thinking Aloud: The #1 Usability Tool*. Retrieved from Nielsen Norman Group: <https://www.nngroup.com/articles/thinking-aloud-the-1-usability-tool/>
- Nielson, J. (1994, November 1). *How to Conduct a Heuristic Evaluation*. Retrieved from Nielsen Norman Group: <https://www.nngroup.com/articles/how-to-conduct-a-heuristic-evaluation/>
- PayScale. (2020, February 28). *Average Accountant Salary in Australia*. Retrieved from PayScale: <https://www.payscale.com/research/AU/Job=Accountant/Salary>
- PNGTree. (2020, May 21). *Free People PNG Images*. Retrieved from PNGTree: <https://pngtree.com/free-people-png>
- Purwar, S. (2019, February 6). *Breaking down Fitts law for UX designers*. Retrieved from UX Planet: <https://uxplanet.org/breaking-down-fitts-law-for-ux-designers-542cabb48f9>
- Reed, J. (2020, May 9). SUS Evaluation. (L. Wardropper, Interviewer)
- Roberts, F. (2020, May 12). Time on Task and Think Aloud Evaluation. (L. Wardropper, Interviewer)
- Robertson, M. (2020, April 11). Design Walkthrough Evaluation. (L. Wardropper, Interviewer)
- Robertson, M. (2020, April 15). TAM Evaluation. (L. Wardropper, Interviewer)
- Robertson, M. (2020, May 8). Time on Task and Think Aloud Evaluation. (L. Wardropper, Interviewer)
- Sattler, J. (2020, May 24). Heuristic Evaluataion. (L. Wardropper, Interviewer)
- Sattler, J. (2020, May 8). SUS Evaluation. (L. Wardropper, Interviewer)
- Sattler, J. (2020, April 15). TAM Evaluation. (L. Wardropper, Interviewer)
- Sauro, J. (2011, February 2). *MEASURING USABILITY WITH THE SYSTEM USABILITY SCALE (SUS)*. Retrieved from MeasuringU: <https://measuringu.com/sus/>

- Sauro, J. (2019, May 7). *10 THINGS TO KNOW ABOUT THE TECHNOLOGY ACCEPTANCE MODEL*. Retrieved from MeasuringU: <https://measuringu.com/tam/>
- Skelley, G. (2019, September 19). *Just how many swing voters are there?* Retrieved from FiveThirtyEight: <https://fivethirtyeight.com/features/just-how-many-swing-voters-are-there/>
- Smith, J. (2020, April 13). Co-design Evaluation. (L. Wardropper, Interviewer)
- Smith, M. (2015, July 16). *Digital Trust in the IoT Era: 54% of people don't trust security protecting their info.* Retrieved from CSO Australia: <https://www.csoonline.com/article/2948583/digital-trust-in-the-iot-era-54-of-people-dont-trust-security-protecting-their-info.html>
- Song, H. (2020, May 25). Heuristic Evaluation. (L. Wardropper, Interviewer)
- Sparkles, D. (2019, November 21). *Half of all Australian kids have hands on mobile phones, according to Communication and Media Authority survey.* Retrieved from ABC News: <https://www.abc.net.au/news/2019-11-21/phone-use-rises-among-australian-children/11722920>
- Statista. (2019, January 12). *Share of population who hold a bachelor level degree or above in Australia from 1989 to 2018.* Retrieved from Statista: <https://www.statista.com/statistics/612854/australia-population-with-university-degree/>
- Todorovic, D. (2008, August 13). *Gestalt Principles.* Retrieved from Scholarpedia: http://www.scholarpedia.org/article/Gestalt_principles
- Wang, J. (2020, May 9). SUS Evaluation. (L. Wardropper, Interviewer)
- Wardropper, N. (2020, May 9). SUS Evaluation. (L. Wardropper, Interviewer)
- Williamson, L. (2020, April 10). Design Walkthrough Evaluation. (L. Wardropper, Interviewer)
- Williamson, L. (2020, May 10). Time on Task and Think Aloud Evaluation. (L. Wardropper, Interviewer)
- Zaloom, C. (2019, August 30). *How Paying for College Is Changing Middle-Class Life.* Retrieved from The New York Times: <https://www.nytimes.com/2019/08/30/opinion/sunday/college-tuition.html>

Appendix

Low-Fidelity Prototype Evaluation

Design Walkthrough Evaluation Protocol

Evaluation ID User Test 001	
Aims/Purposes	Conduct a design walkthrough of a paper prototype for an electronic voting app.
Date/s	10-15 April 2020
Creator	Lachlan Wardropper

Preparation before the participant arrives

Prepare the material being used for the user testing session:

1. Consent forms
2. Observation sheets
3. Task sheet
4. Paper for the user to write any notes
5. Questionnaire
6. People – Lachlan Wardropper

Introduction

[Introductions, thanking them for being there]. Today we are going to get you to perform some tasks regarding an electronic voting app for general elections.

We are looking at how easy it is for you to use the application, how well you understand the process of interaction, and whether there are any problems with the interface.

There is a consent form that we need you to complete. It tells you what the purpose of this task is today and how the data will be used. This is a voluntary task and if you feel uncomfortable please feel free to stop the testing session. Through this process, we are not evaluating you in any way, we are evaluating the software and how effective the design is.

Consent

User reads through, fills in and signs consent form. We fill in our parts as well.

Thanks for providing consent. Just a reminder you can withdraw from this task at any time without any negative consequences to you.

Design Walkthrough Task

Instructions

We would like you to follow the instructions below and complete the task. You will be given 10 minutes to work on the task.

Please remember that we are not assessing you, we are assessing the software that you are using.

Do you have any questions about the task you are about to complete?

Today we would like you to complete the following tasks:

1. *Look at the policies of a candidate running in the election*
2. *Cast a vote and submit it*
3. *Check the results for the district you voted in*

Task Notes

Roles

Facilitator	Lachlan Wardropper
Videoing of the Task	Lachlan Wardropper
Observations of the person & discussions	Lachlan Wardropper
Recording time and steps (interaction flow)	Lachlan Wardropper

Task Details

When the participant is ready, ask the participant to start on the task:

1. Look at the policy of a candidate running in the election
 - Note how the user found the campaign screen
 - Their opinions on the format of the home screen/campaign screen
 - The time taken to view candidate information
 - Total number of clicks to view information
 - Record the steps undertaken to view information - note process undertaken
2. Cast a vote and submit it
 - Record the steps undertaken to cast a vote - note process undertaken
 - Search for information of the task - note the process of finding information
 - Record time taken to reach cast a vote
 - Ask user what happened and what they expected
3. Check the results for their district
 - Record the steps undertaken to view results - note process undertaken
 - Record time taken to reach the page
 - Ask user what happened/what they expected

After the testing session, we will reassure them that “they are fantastic for volunteering their time and that we now have the information we need for that part of our session”

Post-interaction Questionnaire

Ask the participant to answer a short questionnaire that can be accessed via a google forms link.
It contains a few detailed short answer questions about your experience, followed by a few quick response questions to rate your experience.

Questions

- Was there anything confusing first glance?
- Would you ever use this system in the future? why/why not?
- Did you have any difficulties throughout the process?
- Did anything happen that you did not expect?
- Rating your experience from 1-5, how easy did you find the tasks?
- Rating your experience from 1-5, how helpful did you find the information in the app?

Closing

Tell the participant that the session is at an end. Remind them about consent being voluntary and that they can withdraw at any time.

Thank you for volunteering your time, and your data is valuable.

Let participant know that they are free to go.

Design Walkthrough Evaluation Results

Participant 1 - Lesley Williamson

Campaign Screen

Note how the user found the campaign screen:

- Found the icon with the candidate info quite easily and was seen to have no issues

Their opinions on the format of the home screen/campaign screen:

- *"I like how the different menu options are nice and large. I don't feel overwhelmed by all the options on screen which is nice. When I look at the campaign information screen I see a pretty simple layout, and I've had no real issues so far trying to find information. The only thing I've had difficulty with is the there is no back button on the campaign page? I'm not too sure how I'm supposed to get back to the home page or anything."*

The time taken to find candidate information:

- ~7 seconds

Total number of clicks to view information:

- 2

Record the steps undertaken to view information - note process undertaken:

- User looks around the home screen very briefly, finds the menu item and presses it.
- Adobe XD changes pages
- User appears to search around the screen briefly, before pressing the first candidate where Adobe XD then changes pages again
- Timer is paused and questions are asked

Voting Screen

Record the steps undertaken to cast a vote - note process undertaken:

- User taps the back button from the john doe page of the candidate information section
- User sees the submit button and taps it
- Vote submitted screen appears
- Timer is paused and questions are asked

Search for information of the task - note the process of finding information:

- User pressed the go back button instead of vote now button and then said "whoops"
- Vote now button was quickly pressed in campaign info screen
- Submit button pressed after user hovered the mouse over different voting options

Record time taken to reach cast a vote:

- ~11 seconds

Ask user what happened and what they expected:

- *"It was fairly similar to what I would expect really, the actual voting screen was pretty similar to the one you'd normally see. I wasn't expecting the go back to be right next to the vote now button though, I accidentally pressed it thinking it was the other one. Apart from that I think I was pretty quick really."*

Results Screen

Record the steps undertaken to view results - note process undertaken:

- User presses the home button
- User presses results screen
- User stops at national screen, not knowing there was a results screen for the district

Record time taken to reach the page:

- ~7 seconds

Ask user what happened/what they expected:

- *I mention to the user that the results for Forde were on a seperate tab of the screen*
- *"Oh... I didn't realise those were the results you were after, I just saw the big list of districts and thought that was it. I thought it was a bit surprising that there wasn't like a results button from the voting screen."*

Participant 2 - Matthew Robertson

Campaign Screen

Note how the user found the campaign screen:

- Found the icon with the candidate info and pressed it
- User hovered mouse for upwards of 10 seconds before asking whether this was it

Their opinions on the format of the home screen/campaign screen:

- *"I didn't know you could press the different candidate buttons to read more. I thought maybe it was a scrolling page or something."*

The time taken to find candidate information:

- ~18 seconds

Total number of clicks to view information:

- 5

Record the steps undertaken to view information - note process undertaken:

- User looks around the home screen very briefly, finds the menu item and presses it.
- Adobe XD changes pages
- User appears to search around the screen looking for a button to view information
- User gives up after 10 seconds and asks whether this is the screen he was asked to reach
- Timer is paused and questions are asked

Voting Screen

Record the steps undertaken to cast a vote - note process undertaken:

- User is told how to reach John Doe page to start next step of evaluation
- User taps vote now button on John Doe page
- User sees the submit button on voting screen and taps it
- Vote submitted screen appears
- Timer is paused and questions are asked

Search for information of the task - note the process of finding information:

- User found the vote now button, but hesitated to press it as mouse hovered for a bit
- Submit button pressed after user hovered the mouse over different voting options

Record time taken to reach cast a vote:

- ~8 seconds

Ask user what happened and what they expected:

- *"I wasn't too sure whether the vote now button meant that I was just voting for this guy. I don't know if you could tell but I was reluctant to press it in case I skipped the actual voting page."*

Results Screen

Record the steps undertaken to view results - note process undertaken:

- User presses the see results button
- User reaches the results page

Record time taken to reach the page:

- ~3 seconds

Ask user what happened/what they expected:

- *"That was pretty self-explanatory, I found that pretty easy. See results link wasn't very big compared to the home button but I still found it."*

Participant 3 - Adelaide Clarke

Campaign Screen

Note how the user found the campaign screen:

- Found the icon with the candidate info and pressed it
- User pressed a candidate screen at what appeared to be random

Their opinions on the format of the home screen/campaign screen:

- *"I liked the picture on the home screen of the person with the sign- made it pretty obvious. Looking at the info screen of John Doe, it would be really annoying to go back and press*

another person every time. I reckon a tinder swipe would be fun and quicker. That way I can get through the candidates quicker easier”

The time taken to find candidate information:

- ~5 seconds

Total number of clicks to view information:

- 2

Record the steps undertaken to view information - note process undertaken:

- User looks around the home screen very briefly, finds the menu item and presses it.
- Adobe XD changes pages
- User moves mouse arounds screen before hitting Jane Doe page option (Adobe XD still changes to John Doe page)
- Timer is paused and questions are asked

Voting Screen

Record the steps undertaken to cast a vote - note process undertaken:

- User taps vote now button on John Doe page
- User hovers over options and then sees the submit button on voting screen and taps it
- Vote submitted screen appears
- Timer is paused and questions are asked

Search for information of the task - note the process of finding information:

- User found the vote now button and pressed it immediately
- Submit button pressed after user hovered the mouse over different voting options

Record time taken to reach cast a vote:

- ~ 5 seconds

Ask user what happened and what they expected:

- “*Yea the voting screen was pretty familiar so it was pretty much what I expected.*”

Results Screen

Record the steps undertaken to view results - note process undertaken:

- User presses the see results button
- User reaches the results page

Record time taken to reach the page:

- ~3 seconds

Ask user what happened/what they expected:

- “*The results page seems like it has a lot of info, but I guess if it’s all important then it needs to be there. If you could make it more visual that would probably be easier*”

Participant 4 - Michael Moore

Campaign Screen

Note how the user found the campaign screen:

- Found the icon with the candidate info and pressed it
- User pressed the John Doe candidate icon

Their opinions on the format of the home screen/campaign screen:

- “*Simple navigation with nice big pictures made it very easy. It kind of reminded me of a news app with the different options. Also, being able to vote at any point of reading the information of different people would be very useful for people who forget things easily.*”

The time taken to find candidate information:

- ~6 seconds

Total number of clicks to view information:

- 2

Record the steps undertaken to view information - note process undertaken:

- User looks around the home screen very briefly, finds the menu item and presses it.
- Adobe XD changes pages
- User moves mouse arounds screen before hitting John Doe menu button

- Timer is paused and questions are asked

Voting Screen

Record the steps undertaken to cast a vote - note process undertaken:

- User taps back button on John Doe page
- User presses the voting button in candidate info screen
- User hovers over options and then sees the submit button on voting screen and taps it
- Vote submitted screen appears
- Timer is paused and questions are asked

Search for information of the task - note the process of finding information:

- User did not see the vote now button and instead pressed back arrow at top of screen
- Submit button pressed as soon as screen entered

Record time taken to reach cast a vote:

- ~8 seconds

Ask user what happened and what they expected:

- *"I pressed back on the campaign screen, saw the big voting icon and then hit submit. That's pretty much how I expected it"*

Results Screen

Record the steps undertaken to view results - note process undertaken:

- User presses the large home button
- User presses results button on home screen
- Timer is paused and questions are asked

Record time taken to reach the page:

- ~5 seconds

Ask user what happened/what they expected:

- *"I noticed the results link after I pressed the home button. I kind of rushed through it but I did see it! Then I just pressed the results button and there we are. It's pretty much as I expected, hard to tell if it could be better since its all hand-drawn."*

Participant 5 - Thomas Doran

Campaign Screen

Note how the user found the campaign screen:

- Found the icon with the candidate info and pressed it
- User pressed party policy title to try and display information
- User pressed the John Doe candidate icon

Their opinions on the format of the home screen/campaign screen:

- *"I pressed the campaign info on the homescreen, that was nice and simple. Tried to press the party policy text but then I realised you can press the options like the home screen."*

The time taken to find candidate information:

- ~7 seconds

Total number of clicks to view information:

- 3

Record the steps undertaken to view information - note process undertaken:

- User looks around the home screen very briefly, finds the menu item and presses it.
- Adobe XD changes pages
- User presses the 'Candidate Info' text at top of screen
- User moves mouse arounds screen before hitting John Doe menu button
- Timer is paused and questions are asked

Voting Screen

Record the steps undertaken to cast a vote - note process undertaken:

- User presses vote now button
- User hovers over options and then sees the submit button on voting screen and taps it

- Vote submitted screen appears
- Timer is paused and questions are asked

Search for information of the task - note the process of finding information:

- User notices vote now option and presses it
- Submit button pressed once user goes over candidates

Record time taken to reach cast a vote:

- ~6 seconds

Ask user what happened and what they expected:

- *"It was nice that I could go straight from the candidate to vote. If there was actually stuff on the page I wouldn't forget it."*

Results Screen

Record the steps undertaken to view results - note process undertaken:

- User presses the see results button
- Timer is paused and questions are asked

Record time taken to reach the page:

- ~4 seconds

Ask user what happened/what they expected:

- *"I just pressed the see results button, was exactly how I expected. If I were to vote I would definitely want to be able to see the results of the election as soon as I have voted just to see if I was with the majority. I think it also would make me feel like I've had more of an impact than just hearing about it later."*

Post-interaction Questionnaire

All information in this section was pulled from the results of the google forms document linked to participants at the end of a session.

Questions

- Was there anything confusing at first glance?
 - The results screen was a lot to process
 - No
 - Nothing was noticeably confusing, I did struggle with finding the results
 - Going from candidates to voting
 - No
- Would you ever use this system in the future? why/why not?
 - Yes it would be much better than voting in person
 - It would have to be secure but yes
 - Yes - very convenient
 - Yes assuming it worked and was secure
 - Yes but security is key
 - Undecided, I'm not sure I would trust myself to get it right
- Did you have any difficulties throughout the process?
 - Mostly no
 - Not really and if I got something wrong it was easy to recover
 - No
 - Yes just going from candidate to voting
 - No
- Did anything happen that you did not expect?
 - No
 - Pressing the image of a candidate brought up more info
 - No
 - No
 - No
- Rating your experience from 1-5, how easy did you find the tasks?

- 4
- 3
- 4
- 3
- 5
- Rating your experience from 1-5, how helpful did you find the information in the app?
 - 3
 - 2
 - 3
 - 4
 - 3

Co-Design Evaluation Protocol

Evaluation ID		User Test 002
Aims/Purposes	Explain the system to the user in order to run a co-design session that will help gain insight into the limitations of the design.	
Date/s	10-15 April 2020	
Creator	Lachlan Wardropper	

Preparation before the participant arrives

Prepare the material being used for the user testing session:

1. Consent forms
2. Observation sheets
3. Task sheet
4. Paper for the user to write any notes
5. Questionnaire
6. People - Lachlan Wardropper

Introduction

[Introductions, thanking them for being there]. Today I am going to walk you through the paper prototype for an electronic voting app for general elections.

After this, I'm going to discuss the prototype with you to receive feedback and see if you can identify any flaws in the design.

I am looking at how easy it is for you to use the application, how well you understand the process of interaction, and whether there are any problems with the interface.

There is a consent form that I need you to complete. It tells you what the purpose of this task is today and how the data will be used. This is a voluntary task and if you feel uncomfortable please feel free to stop the testing session.

Consent

User reads through, fills in and signs consent form. I fill in our parts as well.

Thanks for providing consent. Just a reminder you can withdraw from this task at any time without any negative consequences to you.

Co-design Walkthrough

Instructions

I would like you to watch my demonstration of the app, and if you have any queries or concerns please discuss them with me.

Do you have any questions about the session we are about to complete?

Task Notes

Roles

Facilitator	Lachlan Wardropper
Videoing of the Task	Lachlan Wardropper
Observations of the person & discussions	Lachlan Wardropper
Recording time and steps (interaction flow)	Lachlan Wardropper

Session Details

To start, I'm going to show you how somebody would vote on the app under the assumption they don't know anything about the candidates.

[Show user me navigating from home-screen to candidate info screen]

Now that I've reached this screen, you can see there is a variety of different candidates that show you their names, affiliated party and an image. Say I wanted to select one to view their information, I can do so like this:

[Press candidate card and change to detailed information screen]

Remember you can stop me at anytime if you have anything you want input regarding confusion or issues with what I'm doing.

Now you can see this is where the candidate and their party are able to market their policies as well as any information they would deem important. Assuming we now know who we want to vote for, I'm going to move on to the voting screen.

[Go back to home menu and navigate to voting menu]

Now that I'm here I can simply number the various candidates I'm interested in like so [number candidates]. Once I'm happy with this I can press submit and it will show me a confirmation.

[Display 'Vote Submitted' page or prototype]

I would have now voted in the election. If I wanted to then see the current results, I would do so by simply exiting this screen and navigating to the results section of the app.

[Show user how I would change to this screen]

Now that I'm here, I have the option to view the results for the nation as a whole, as well as the district I am in and any other that might interest me.

That is all for my demonstration, I will give you a moment to rethink what I have shown you. [Wait a few moments].

Discussion

I'm going to begin the discussion by asking you if there was anything you found to be surprising throughout the demonstration?

[Await response, if anything then lead discussion down that path]

So now we're going to go through the process again, however I want you to tell me what you would do at certain points. Also, if there are any UI elements you don't like the look of, this could include entire screens or menu layout, please quickly sketch what you would find more appropriate.

[At points where they say something, ask for them to elaborate and draw a new design if possible]

After the discussion session, I will reassure them that “they are fantastic for volunteering their time and that I now have the information I need for that part of our session”

Closing

Tell the participant that the session is at an end. Remind them about consent being voluntary and that they can withdraw at any time.

Thank you for volunteering your time, and your data is valuable.

Let participant know that they are free to go.

Co-design Evaluation Results

Participant 1 - Bella Clarke

Notes during demonstration:

- Participant was seen nodding head throughout demonstration
- When shown John Does information page, participant asked “So if you hit the vote now button does it fill in his box as number one? Or would you still have to do that? I explained that this takes me to the voting screen but I’m required to fill in the boxes still.
- When shown results participant said “*What does the table mean?*”

Notes during discussion:

I’m going to begin the discussion by asking you if there was anything you found to be surprising throughout the demonstration?

- *“Surprising - not really. It definitely is a really useful feature to be able to see everyone you’re voting for. I think it would really help educate voters which is needed at the moment. I found that John Doe page a little weird though, like the vote now button just looked a bit funny.”*

What do you mean looked a bit funny?

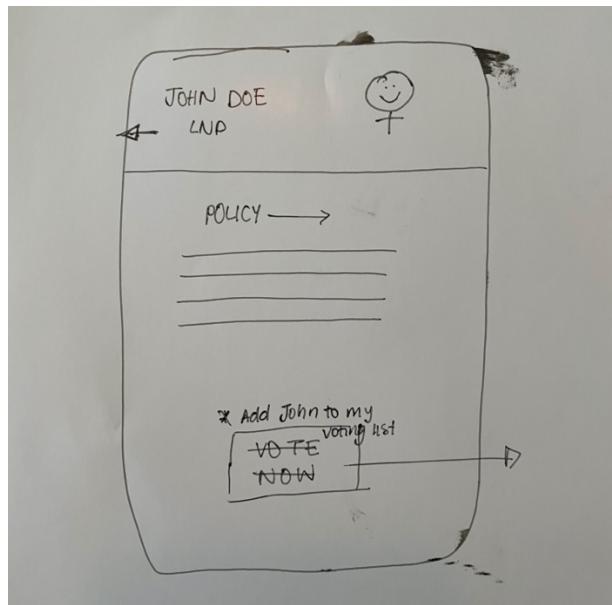
- *“It kind of looked out of place, and I didn’t really get why it would be on his page but didn’t vote for him? Like I think it could have been a “vote for John Doe” button, that would make sense to me.”*

Could you elaborate?

- *“Maybe you have like a voting list and you can add the people to the list, then when you go to the voting screen it fills out for you. I think otherwise it would be really easy to forget the order of your preferences without there being a way to either record the candidates in a list or re-visit them while voting.”*

So now we’re going to go through the process again, however I want you to tell me what you would do at certain points. Also, if there are any UI elements you don’t like the look of, this could include entire screens or menu layout, please quickly sketch what you would find more appropriate.

- “I can try redrawing the John Doe page, I’m not very neat but it could help. Its pretty similart to be honest”



- “You can see what I mean with the list though? I think it would be a cool feature for sure”

Participant 2 - Jameson Smith

Notes during demonstration

- Participant showed interest in home screen and candidate screen
- Participant asked “Would the politicians themselves put the information in or would you?”
- Participant commented on the voting screen saying it looked “nice and easy to follow”
- Participant commented on results screen “Probably doesn’t need that much info”

Notes during discussion

I’m going to begin the discussion by asking you if there was anything you found to be surprising throughout the demonstration?

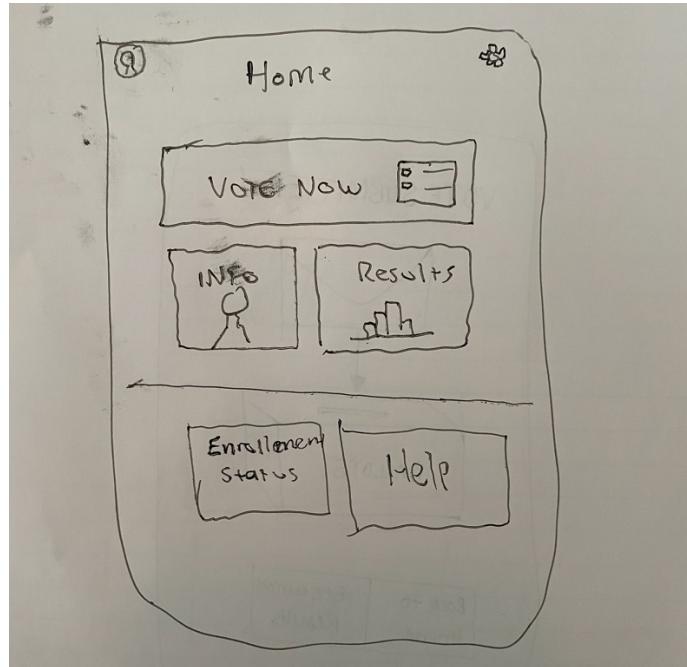
- “Yea if you go back to the homescreen I was surprised to see the profile option as a main menu button. The other stuff is more important I think. If anything I thought you would have more important features maybe that could go there instead. Also, there is no way of knowing whether there is an election on, which I’d say is important since people don’t really pay enough attention to know what day they have to vote.”

What other features do you think are more important?

- “Maybe like a new feature, or a help button for some of the older people. I would say the photos for profile and candidate info are too similar as well which is a shock. So yea... now that I think about it you should definitely have news or something instead.”

So now we’re going to go through the process again, however I want you to tell me what you would do at certain points. Also, if there are any UI elements you don’t like the look of, this could include entire screens or menu layout, please quickly sketch what you would find more appropriate.

- “If you just wait a moment I’ll quickly draw out the home screen again. Give you a better idea of what I’m saying”.



- “I like the candidate screen I’d just be super careful what goes in there”

Participant 3 - Marise Forde

Notes during demonstration

- Participant did not say anything during demonstration

Notes during discussion

I’m going to begin the discussion by asking you if there was anything you found to be surprising throughout the demonstration?

- “No. Not at all. I think it was a lovely design that was very easy for someone like me to follow. I liked the help buttons on some of the screens.”

So now we’re going to go through the process again, however I want you to tell me what you would do at certain points. Also, if there are any UI elements you don’t like the look of, this could include entire screens or menu layout, please quickly sketch what you would find more appropriate.

- Throughout second demonstration participant did not intervene to recommend any new design features
- “I can’t think how I would improve it. I’m sorry I’m not being very helpful right now. Maybe if I saw more I could help you out more.”

Participant 4 - Jack Sattler

Notes during demonstration

- In reference to the voting screen, participant stated “What happens if I closed the app in the middle of voting?”
- When reaching the results screen for the demonstration, user immediately said “Woah...that is a lot of stuff”

Notes during discussion

I’m going to begin the discussion by asking you if there was anything you found to be surprising throughout the demonstration?

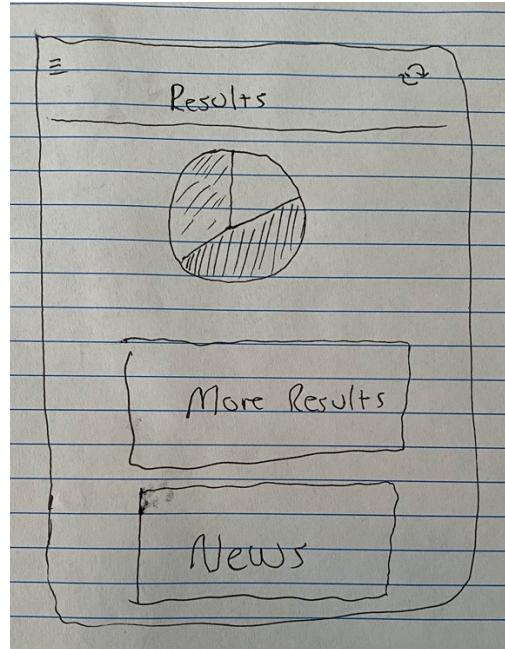
- “Not going to lie, that results screen surprise me a bit. I thought there would be like one graph and that’s it.”

Why did you expect that?

- “When I think of election results I just think of the country. I don’t know if most people would care about the other areas so much. Keep it simple I reckon.”

So now we’re going to go through the process again, however I want you to tell me what you would do at certain points. Also, if there are any UI elements you don’t like the look of, this could include entire screens or menu layout, please quickly sketch what you would find more appropriate.

- “Lets go back to the results page and I’ll whip up a quick sketch”



- “If you have a button to more results, people who don’t care won’t have to look at it, but for the people who do at least it’s there. And the news... I guess some people would probably care about that”

Participant 5 – Nikhil Naik

Notes during demonstration

- Participant did not engage in questioning during the demonstration phase of the evaluation

Notes during discussion

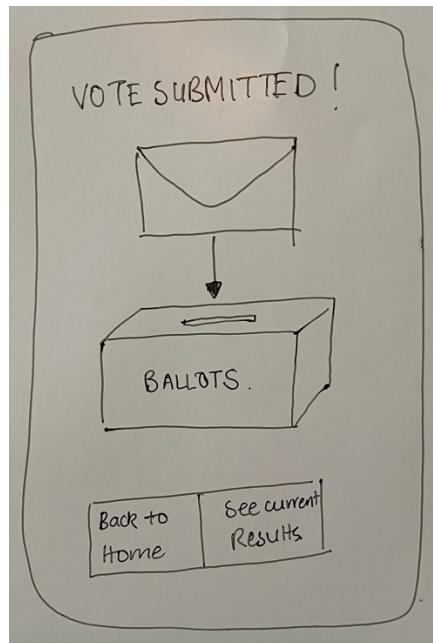
I’m going to begin the discussion by asking you if there was anything you found to be surprising throughout the demonstration?

- “Not particularly No”

So now we’re going to go through the process again, however I want you to tell me what you would do at certain points. Also, if there are any UI elements you don’t like the look of, this could include entire screens or menu layout, please quickly sketch what you would find more appropriate.

- When the vote submitted screen was reached, the participant said “Actually... this screen is kind of weird. I don’t know why you would need proof, wouldn’t it just get sent to you? When I think of other apps, I feel like the whole processes of confirmation is done automatically. It’s like a receipt, we all should get one and if someone forgets- which I would, it could be bad.”

User was asked to draw their ideas.



- “This is better probably, it gets rid of the proof writing and just keeps the other things.”

TAM Evaluation Protocol

Evaluation ID User Test 003	
Aims/Purposes	Conduct a design walkthrough of a paper prototype for an electronic voting app.
Date/s	10-15 April 2020
Creator	Lachlan Wardropper

Preparation before the participant arrives

Prepare the material being used for the user testing session:

1. Consent forms
2. Observation sheets
3. Task sheet
4. Paper for the user to write any notes
5. Questionnaire
6. People – Lachlan Wardropper

Introduction

[Introductions, thanking them for being there]. Today we are going to get you to perform some tasks regarding an electronic voting app for general elections.

We are looking at how easy it is for you to use the application, how well you understand the process of interaction, and whether there are any problems with the interface.

There is a consent form that we need you to complete. It tells you what the purpose of this task is today and how the data will be used. This is a voluntary task and if you feel uncomfortable please feel free to stop the testing session. Through this process, we are not evaluating you in any way, we are evaluating the software and how effective the design is.

Consent

User reads through, fills in and signs consent form. We fill in our parts as well.

Thanks for providing consent. Just a reminder you can withdraw from this task at any time without any negative consequences to you.

Task

Instructions

We would like you to follow the instructions below and complete the task. You will be given 10 minutes to work on the task.

Please remember that we are not assessing you, we are assessing the software that you are using.

Do you have any questions about the task you are about to complete?

Today we would like you to complete the following tasks:

1. *Look at the policies of a candidate running in the election*
2. *Cast a vote and submit it*
3. *Check the results for the district you voted in*

Task Notes

Roles

Facilitator	Lachlan Wardropper
Videoing of the Task	Lachlan Wardropper
Observations of the person & discussions	Lachlan Wardropper
Recording time and steps (interaction flow)	Lachlan Wardropper

Task Details

When the participant is ready, ask the participant to start on the task:

1. Look at the policy of a candidate running in the election
2. Cast a vote and submit it
3. Check the results for their district

After the testing session, we will reassure them that “they are fantastic for volunteering their time and that we now have the information we need for that part of our session”

TAM Survey and Questions

Next, get the user to fill out the TAM survey by linking the google forms response sheet via zoom.

[Wait until the user has completed the TAM survey.]

Dimension	Question
PU1	I can accomplish my voting in a general election more quickly using eVoting Australia
PU2	I can accomplish my voting in a general election more easily using eVoting Australia
PU3	eVoting Australia enhances my effectiveness in utilizing online voting
PU4	eVoting Australia enhances my efficiency in utilizing online voting
PU5	eVoting Australia enables me to make better decisions in utilizing online voting

PU6	Overall, I find eVoting Australia useful
PEOU1	Learning to use eVoting Australia is easy for me
PEOU2	It is easy to use eVoting Australia to accomplish my voting in a general election
PEOU3	Overall, I believe eVoting Australia is easy to use
ATT1	In my opinion, it is desirable to use eVoting Australia
ATT2	I think it is good for me to use eVoting Australia
ATT3	Overall, my attitude towards eVoting Australia is favourable
ITO1	I will use eVoting Australia on a regular basis in the future
ITO2	I will frequently use eVoting Australia in the future
ITO3	I will strongly recommend others to use eVoting Australia

Next, ask the participant the following questions and follow-up their answers with additional questions if appropriate.

- What did you answer for “Learning to use eVoting Australia is easy for me” and why?
- What did you answer for “I can accomplish my voting in a general election more easily using eVoting Australia” and why?
- What did you answer for “It is easy to use eVoting Australia to accomplish my voting in a general election” and why?
- What did you answer for “Overall, I believe eVoting Australia is easy to use” and why?

Closing

Tell the participant that the session is at an end. Remind them about consent being voluntary and that they can withdraw at any time.

Thank you for volunteering your time, and your data is valuable.

Let participant know that they are free to go.

TAM Evaluation Results

From the question list above, the following table is a list of results from five users.

Dimension	R1	R2	R3	R4	R5
PU1	4	4	3	3	4
PU2	3	3	4	3	2
PU3	3	3	3	2	4
PU4	2	2	3	2	3
PU5	2	3	3	2	2
PU6	4	4	3	3	4
PEOU1	3	3	4	3	3
PEOU2	3	2	4	3	3
PEOU3	3	3	4	3	4
ATT1	4	4	3	3	4
ATT2	2	3	4	3	2
ATT3	3	4	4	4	3

ITO1	2	2	3	2	3
ITO2	1	2	2	1	3
ITO3	3	3	2	1	2

Responses to Questions

Respondent 1 – Jack Sattler:

What did you answer for “Learning to use eVoting Australia is easy for me” and why?

- *“I gave it a 3, I think it was pretty easy to follow given the circumstances”*

What did you answer for “I can accomplish my voting in a general election more easily using eVoting Australia” and why?

- *“I believe a 3 again, its a hypothetical obviously but I think it would be easier. Definitely time consuming”*

What did you answer for “It is easy to use eVoting Australia to accomplish my voting in a general election” and why?

- *“3. I think it would be. The only thing I noticed lacking was that there were no reminders for anything, which would have made it easier. For example, something to tell me that I needed to update my address or email. Although they’re pretty small things, they’d make a big difference and I’d expect them to be there.”*

What did you answer for “Overall, I believe eVoting Australia is easy to use” and why?

- *“3. It was generally pretty easy to do the tasks and there were no real issues.”*

Respondent 2 – Nikhil Naik:

What did you answer for “Learning to use eVoting Australia is easy for me” and why?

- *“I gave that one a 3. I found I picked it up fairly easily”*

What did you answer for “I can accomplish my voting in a general election more easily using eVoting Australia” and why?

- *“I gave that on a 3. Its hard to tell but given my performance I’d say I would”*

What did you answer for “It is easy to use eVoting Australia to accomplish my voting in a general election” and why?

- *“Again, there’s no evidence to say I agree, so I gave that a 2.”*

What did you answer for “Overall, I believe eVoting Australia is easy to use” and why?

- *“3. I had no real issues doing the tasks”*

Respondent 3 – Bella Clarke:

What did you answer for “Learning to use eVoting Australia is easy for me” and why?

- *“4. I agree it was very easy”*

What did you answer for “I can accomplish my voting in a general election more easily using eVoting Australia” and why?

- *“4. Kind of the same as the last one, it was easy”*

What did you answer for “It is easy to use eVoting Australia to accomplish my voting in a general election” and why?

- *“4... You get the idea haha”*

What did you answer for “Overall, I believe eVoting Australia is easy to use” and why?

- *“Another 4, I really liked the screens and the easiness of it all”*

Respondent 4 – Adelaide Clarke:

What did you answer for “Learning to use eVoting Australia is easy for me” and why?

- *“I think that one was a 3, I had some difficulty but nothing major”*

What did you answer for “I can accomplish my voting in a general election more easily using eVoting Australia” and why?

- “3. Going in person is such a pain and this saves time.”

What did you answer for “It is easy to use eVoting Australia to accomplish my voting in a general election” and why?

- “3. Assuming the actual app is the same then it would be easy, especially after the first go.”

What did you answer for “Overall, I believe eVoting Australia is easy to use” and why?

- “3. It was easy to use”

Respondent 5 – Matthew Robertson:

What did you answer for “Learning to use eVoting Australia is easy for me” and why?

- “I decided on a 3. Compared to some of the stuff I’ve had to use this seemed quite friendly”

What did you answer for “I can accomplish my voting in a general election more easily using eVoting Australia” and why?

- “I gave this a 2. I did find that a lot of the features of the app were things I didn’t need but couldn’t avoid. Normally I avoid all of that stuff and go straight to voting. It would be nice if I could do the same with this.”

What did you answer for “It is easy to use eVoting Australia to accomplish my voting in a general election” and why?

- “3. I think it would be fairly easy given I could have some help”

What did you answer for “Overall, I believe eVoting Australia is easy to use” and why?

- “I was generous and gave you a 4. I’ll give you the benefit of the doubt and say it was me who was the problem. It was easier than plenty of other applications I’ve been made to use.”

Medium-Fidelity Prototype Evaluation

SUS Evaluation Protocol

Evaluation ID User Test 004

Aims/Purposes	Conduct a design walkthrough followed by a SUS survey of an electronic voting app.
Date/s	8-12 May 2020
Creator	Lachlan Wardropper

Preparation before the participant arrives

Prepare the material being used for the user testing session:

1. Consent forms
2. Observation sheets
3. Task sheet
4. Paper for the user to write any notes
5. Questionnaire

Introduction

[Introductions, thanking them for being there]. Today we are going to get you to perform some tasks regarding an electronic voting app for general elections followed by a small survey.

We are looking at how easy it is for you to use the application, how well you understand the process of interaction, and whether there are any problems with the interface.

There is a consent form that we need you to complete. It tells you what the purpose of this task is today and how the data will be used. This is a voluntary task and if you feel uncomfortable please feel free to stop the testing session. Through this process, we are not evaluating you in any way, we are evaluating the software and how effective the design is.

Consent

User reads through, fills in and signs consent form. We fill in our parts as well.

Thanks for providing consent. Just a reminder you can withdraw from this task at any time without any negative consequences to you.

Design Walkthrough Task

Instructions

We would like you to follow the instructions below and complete the task. You will be given 10 minutes to work on the task.

Please remember that we are not assessing you, we are assessing the software that you are using.

Do you have any questions about the task you are about to complete?

Today we would like you to complete the following tasks:

1. *Navigate to the John Doe candidate information page*
2. *Find the John Doe page from the voting screen*
3. *Check the results of the NSW electoral divisions*

Task Notes

Roles

Facilitator	Lachlan Wardropper
Videoing of the Task	Lachlan Wardropper
Observations of the person & discussions	Lachlan Wardropper
Recording time and steps (interaction flow)	Lachlan Wardropper

Task Details

When the participant is ready, ask the participant to start on the task:

1. Navigate to the John Doe candidate information page
2. Cast a vote and submit it
3. Check the results for their district
4. Send the user the link to the SUS survey and have them fill out the questions giving them a total of five minutes.

After the testing session, we will reassure them that “they are fantastic for volunteering their time and that we now have the information we need for that part of our session”

Post-interaction Questionnaire

Ask the participant a few questions regarding their answers to the SUS survey.

It contains a few detailed short answer questions about your experience, followed by a few quick response questions to rate your experience.

Questions

- Would you use this app for every election? Why or why not?
- What did you answer for “I find the system unnecessarily complex” and why?
- Ask any relevant questions regarding outliers in answers
- How do you feel about the usability and learnability of the app overall?

Closing

Tell the participant that the session is at an end. Remind them about consent being voluntary and that they can withdraw at any time.

Thank you for volunteering your time, and your data is valuable.

Let the participant know that they are free to go.

SUS Evaluation Results

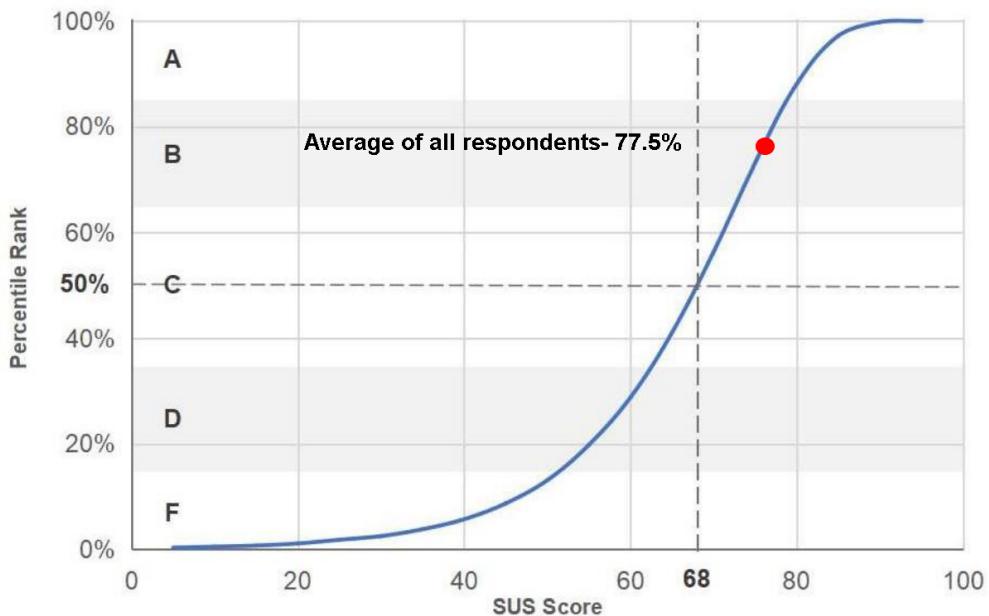
Raw Data from SUS Responses

Question	R1	R2	R3	R4	R5	R6	R7
I think that I would like to use this system frequently.	4	3	5	3	4	3	4
I found the system unnecessarily complex.	2	3	4	3	2	1	1
I thought the system was easy to use.	4	5	4	3	5	4	5
I think that I would need the support of a technical person to be able to use this system	2	1	1	2	1	3	2
I found the various functions in this system were well integrated.	5	4	5	3	3	5	5
I thought there was too much inconsistency in this system.	2	1	2	2	1	1	2
I would imagine that most people would learn to use this system very quickly.	3	4	4	3	4	5	5
I found the system very cumbersome to use.	2	1	2	3	3	2	1
I felt very confident using the system.	4	5	3	3	5	4	4
I needed to learn a lot of things before I could get going with this system.	1	1	2	2	1	3	2

Converted Raw Data from SUS Responses

Question	R1	R2	R3	R4	R5	R6	R7	Average
I think that I would like to use this system frequently.	3	2	4	2	3	2	3	2.714285714
I found the system unnecessarily complex.	3	2	1	2	3	4	4	2.714285714
I thought the system was easy to use.	3	4	3	2	4	3	4	3.285714286
I think that I would need the support of a technical person to be able to use this system	3	4	4	3	4	2	3	3.285714286
I found the various functions in this system were well integrated.	4	3	4	2	2	4	4	3.285714286
I thought there was too much inconsistency in this system.	3	4	3	3	4	4	3	3.428571429
I would imagine that most people would learn to use this system very quickly.	2	3	3	2	3	4	4	3
I found the system very cumbersome to use.	3	4	3	2	2	3	4	3
I felt very confident using the system.	3	4	2	2	4	3	3	3
I needed to learn a lot of things before I could get going with this system.	4	4	3	3	4	2	3	3.285714286
Total for each respondent	77.5	85	75	57.5	82.5	77.5	87.5	77.5

Results of SUS Survey Average



SUS Evaluation Responses

Respondent 1: Jack Sattler

- Would you use this app for every election? Why or why not?
“Yes I would, I think it is much more convenient than using normal voting methods.”
- What did you answer for “I find the system unnecessarily complex” and why?

"I gave that question a 2. I had no problems navigating things and there wasn't too much junk on the page."

- Ask any relevant questions regarding outliers in answers
 - You strongly agreed to the statement "I found the various functions in the system were well integrated", do you have any comments on why?

"Not really, I just found that it made sense and there was nothing I noticed that stood out like a sore thumb."

- How do you feel about the usability and learnability of the app overall?

"Good, it was easy to pick up and I had no problems throughout the session."

Respondent 2: Jordan Liu

- Would you use this app for every election? Why or why not?

"Yep. I don't like going to vote and it would be way quicker."

- What did you answer for "I find the system unnecessarily complex" and why?

"A 3? It wasn't that it was hard it was just completely new and I got a bit lost because there were so many ways to get to the same page"

- Ask any relevant questions regarding outliers in answers

N/A

- How do you feel about the usability and learnability of the app overall?

"It was easy to use, but I think it would take some extra time for someone to get used to. I felt rushed at times."

Respondent 3: Jaime Reed

- Would you use this app for every election? Why or why not?

"I would possibly use it if it was more convenient, but otherwise I'd do what I've always done."

- What did you answer for "I find the system unnecessarily complex" and why?

"Your result section is far too complicated, you don't need that many pages to click through to get to something this simple. Also, it's a lot of candidate information that I don't need to know. It's all nonsense anyway, they don't stick to their word."

- Ask any relevant questions regarding outliers in answers

- If you found the system overly complex, is there a reason you agreed with the statement "I would imagine that most people would learn to use this system very quickly."

"Look, I found it hard to learn but I'm aware that I'm not as good with technology than most people. But it was still easier than most apps I've used. Having said that I was always coming in disadvantaged, so I struggled but I'm sure the younger ones wouldn't."

- How do you feel about the usability and learnability of the app overall?

"Could do with some work, but also could be a heck of a lot worse."

Respondent 4: James Wang

- Would you use this app for every election? Why or why not?

"Probably yes, however I am yet to be fully convinced. There is potential but I would need more substantial evidence to convince me"

- What did you answer for "I find the system unnecessarily complex" and why?

"I gave it a 3. It was neither complex nor easy."

- Ask any relevant questions regarding outliers in answers

- I've noticed that your answers are all consistently around the 3 mark, suggesting you're pretty neutral about everything. Would that be about right?

"Yes. It wasn't that it is a terrible design, it's just that compared to other apps it wasn't as intuitive and some of the features were redundant."

- What features in particular?

"The checklist on the homepage there is three different ways of telling you to go to the profile. That is unnecessarily large. Also, the results are not displayed in the best way. If I've learnt anything it is that people like choice, and if you let them customise the graphs and easily let them display what they want to see, then it would be a much more effective feature. For instance, a heatmap would be great to show national results, much more effective than splitting out into a new menu"

- How do you feel about the usability and learnability of the app overall?

"It can be improved, but you can definitely get to where you need to be with a bit of work"

Respondent 5: Keely Baker

- Would you use this app for every election? Why or why not?

"Definitely. It would be so nice to not go and vote"

- What did you answer for "I find the system unnecessarily complex" and why?

"A 2. It was easy for me to follow the tasks. All the images are there"

- Ask any relevant questions regarding outliers in answers

N/A

- How do you feel about the usability and learnability of the app overall?

"It's really good, I don't think there's much I would change. I had no real issues"

Respondent 6: Nigel Wardropper

- Would you use this app for every election? Why or why not?

"No, I don't like the idea of technology doing something as important as voting. Also I think its such a private task that I don't trust technology enough, and I don't like the idea of people watching me vote. "

- What did you answer for "I find the system unnecessarily complex" and why?

"2. What was in there was necessary to serve the functions it needs"

- Ask any relevant questions regarding outliers in answers

N/A

- How do you feel about the usability and learnability of the app overall?

"It was very good. For such a complex system like voting it was really intuitive to follow."

Respondent 7: Bella Clarke

- Would you use this app for every election? Why or why not?

"Yep. I hate going to vote and any excuse not to would be great"

- What did you answer for "I find the system unnecessarily complex" and why?

"3. I got a bit lost navigating the results but nothing too severe. It is still hard to tell given the pretty basic tasks."

- Do you think you could be assigned harder tasks?

"Maybe getting us to actually vote would be good. I'm not sure about the logistics though."

- How do you feel about the usability and learnability of the app overall?

"Pretty good. Again, hard to tell but I think it's a really sound app"

Time on Task and Think Aloud Evaluation Protocol

Evaluation ID User Test 005

Aims/Purposes	Conduct a Think Aloud and Time on Task evaluation on a diverse range of users.
Date/s	8-12 May 2020
Creator	Lachlan Wardropper

Preparation before the participant arrives

Prepare the material being used for the user testing session:

1. Consent forms
2. Observation sheets
3. Task sheet
4. Paper for the user to write any notes
5. Questionnaire

Introduction

[Introductions, thanking them for being there]. Today we are going to get you to perform a task using an electronic voting app three times followed by a small survey.

We are looking at how easy it is for you to use the application, how well you understand the process of interaction, and whether there are any problems with the interface.

There is a consent form that we need you to complete. It tells you what the purpose of this task is today and how the data will be used. This is a voluntary task and if you feel uncomfortable please feel free to stop the testing session. Through this process, we are not evaluating you in any way, we are evaluating the software and how effective the design is.

Consent

User reads through, fills in and signs consent form. We fill in our parts as well.

Thanks for providing consent. Just a reminder you can withdraw from this task at any time without any negative consequences to you.

Think Aloud and Time on Task

Instructions

We would like you to follow the instructions below and complete the task. There will be three attempts of the same task. Please say anything you like in regard to what you think about the app at any point. Please do not filter what you are saying, just say what you are feeling at any stage. Also, try and perform this task as fast as possible, we will be timing each attempt.

Please remember that we are not assessing you, we are assessing the software that you are using.

Do you have any questions about the task you are about to complete?

Today we would like you to complete the following task:

1. From the home screen, find the results of the election for NSW.

Task Notes

Roles

Facilitator	Lachlan Wardropper
Videoing of the Task	Lachlan Wardropper
Observations of the person & discussions	Lachlan Wardropper
Recording time and steps (interaction flow)	Lachlan Wardropper

Task Details

When the participant is ready, ask the participant to start on the task:

1. Time the participant from the word “Go” to when they reach the page.
2. Use screen recording software to record the users comments to transcribe at a later date
3. Repeat three times with a short 30 second break in between each attempt

After the testing session, we will reassure them that “they are fantastic for volunteering their time and that we now have the information we need for that part of our session”

Post-interaction Questionnaire

Ask the participant a few questions regarding their answers to the SUS survey.

It contains a few detailed short answer questions about your experience, followed by a few quick response questions to rate your experience.

Questions

- How did you find the layout of the results section?
- Were the graphs appropriate?
- Did expressing your feelings throughout the experiment impact your ability to perform the task as fast as possible?

Closing

Tell the participant that the session is at an end. Remind them about consent being voluntary and that they can withdraw at any time.

Thank you for volunteering your time, and your data is valuable.

Let the participant know that they are free to go.

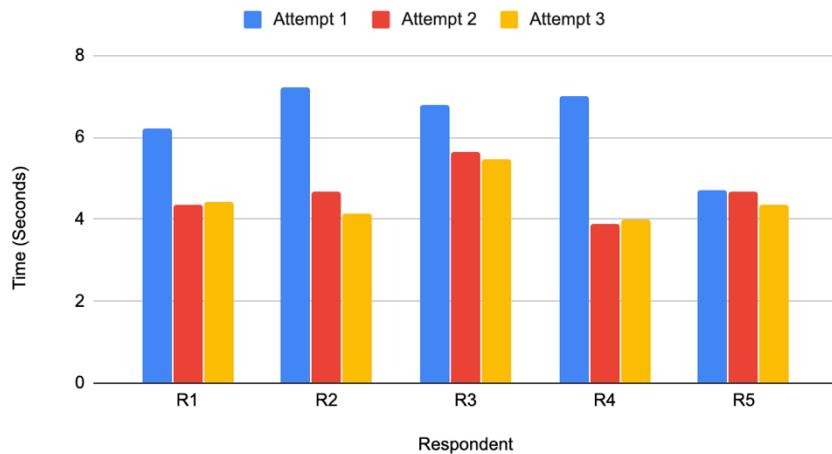
Time on Task and Think Aloud Evaluation Results

Raw Time on Task Data

	R1	R2	R3	R4	R5
Attempt 1	6.21	7.21	6.79	7.02	4.72
Attempt 2	4.37	4.67	5.63	3.87	4.68

Attempt 3	4.44	4.14	5.46	4.01	4.34
------------------	------	------	------	------	------

Time to reach NSW results page from home screen



User Responses, Think Aloud and Time on Task Data

Respondent 1: Michael Moore

Attempt 1:

- Time taken: 6.21 seconds
- “Another menu!”

Attempt 2:

- Time taken: 4.37 seconds
- “It’s so much easier the second time”

Attempt 3:

- Time taken: 4.44 seconds
- “Those graphs are pretty hard to read....”

Post-Interaction Survey:

- How did you find the layout of the results section?

“I thought there were a lot of really dull and uninspired menus to click through to get to that page. Also, I may be wrong but in my opinion something like the results of one of the states too important to be tucked behind those menus.”

- Were the graphs appropriate?

“Could have been bigger but they were simple yes.”

- Did expressing your feelings throughout the experiment impact your ability to perform the task as fast as possible?

“No. I don’t think I really said too much actually... sorry about that.”

Respondent 2: Matthew Robertson

Attempt 1:

- Time taken: 7.21 seconds
- “I’ll go to the results. Don’t see what I’m after so I’ll hit this button. I see NSW so I’ll click that. Here we are?”

Attempt 2:

- Time taken: 4.67 seconds
- “Again. Results, hit this see more divisions button, and then tap NSW”

Attempt 3:

- Time taken: 4.14 seconds

- “Results, see more, NSW.”

Post-Interaction Survey:

- How did you find the layout of the results section?

“I think it was quite intuitive really. No great issues that I spotted.”

- Were the graphs appropriate?

“Can I have another look?.... Hmmm, they are a bit smaller than I’d like. My eyesight isn’t great but they are very easy to understand.”

- Did expressing your feelings throughout the experiment impact your ability to perform the task as fast as possible?

“No I just told you what I was doing really.”

Respondent 3: Lesley Williamson

Attempt 1:

- Time taken: 6.79 seconds
- “This NSW page is a bit boring to look at.”

Attempt 2:

- Time taken: 5.63 seconds
- “I imagine you would have to scroll a long way down to get to some of those remote divisions”

Attempt 3:

- Time taken: 5.46 seconds
- “We go to results, see more, and then NSW... and boom.”

Post-Interaction Survey:

- How did you find the layout of the results section?

“Like I said to you the first time I think it was, you would need to scroll a lot and it could be a bit more interesting.”

- Were the graphs appropriate?

“Yep”

- Did expressing your feelings throughout the experiment impact your ability to perform the task as fast as possible?

“Nah I wouldn’t say so”

Respondent 4: Fletcher Roberts

Attempt 1:

- Time taken: 7.02 seconds
- “I’m looking at the states and I honestly can’t see NSW.... Oh wait it’s right there woops.”

Attempt 2:

- Time taken: 3.87 seconds
- “That menu of states is very hard to read quickly my friend”

Attempt 3:

- Time taken: 4.01 seconds
- “Same thing, I know what I’m doing now.”

Post-Interaction Survey:

- How did you find the layout of the results section?

“It definitely needed a search bar or map to look for divisions. It’s very time consuming and preventable to make people scroll for ten seconds to find a small heading.”

- Were the graphs appropriate?

"They were, but I think there are better ways to show them if that makes sense? Bigger graphs and more graphs on a page would be ideal."

- Did expressing your feelings throughout the experiment impact your ability to perform the task as fast as possible?

"No it didn't. Maybe a tiny tiny bit but not enough to slow me down."

High-Fidelity Prototype Evaluation

Heuristic Evaluation Protocol

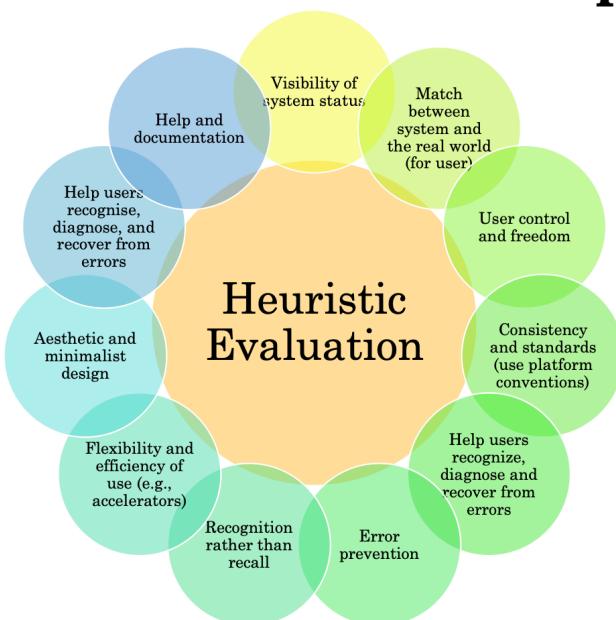
Evaluation ID User Test 006	
Aims/Purposes	Conduct a Heuristic Evaluation sessions based on general heuristic principles and SMART heuristic principles.
Date/s	23-28 May 2020
Creator	Lachlan Wardropper

Find the prototype at: <https://xd.adobe.com/view/0c77e38c-2f4d-4d89-61fe-bd3af0054695-7a46/>

Heuristics Evaluation Instructions

1. Use “wheel” of Heuristics Evaluation as a reference
2. Interact with the eVoting Australia app for a small period of time, trying to engage in tasks including voting, seeing candidate information and looking at results.
3. Complete expert analysis for the application and fill the following table.

Wheel of Heuristics Evaluation



SMART 1	• Provide immediate notification of application status.
SMART 2	• Use a theme and consistent terms, as well as conventions and standards familiar to user.
SMART 3	• Prevent problems where possible; help users if problem occurs, including with network.
SMART 4	• Display an overlay pointing out main features when appropriate or requested to help first-time users.
SMART 5	• Each interface should focus on one task, so that it's glanceable to users who are interrupted frequently.
SMART 6	• Design a visually pleasing interface. Users 'forgive' attractive interfaces.

SMART 7	• Intuitive interfaces make for easier learning
SMART 8	• Design a clear navigable path to task completion
SMART 9	• Allow configuration options and shortcuts.
SMART 10	• Cater for diverse mobile environments (lighting, ambient noise, gloves, etc).
SMART 11	• Facilitate easier input by displaying keyboard buttons that are as large as possible, supporting, multimodal input, and keeping form fields to a minimum.
SMART 12	• Use camera, microphone and sensors to lessen user's workload (e.g. GPS so the user knows where they are and how to get where they need to go)

ABC. (2017, May 6). *Number of children per family*. Retrieved from Australia's Best City: <https://www.australiasbestcity.com.au/fact/223/>

ABS. (2010, October 8). *Shift Workers*. Retrieved from Australian Bureau of Statistics: <https://www.abs.gov.au/ausstats/abs@.nsf/featurearticlesbyCatalogue/5461A9DAE97FF759CA2578C300153388?OpenDocument>

ABS. (2017, Jun 14). *3101.0 - Australian Demographic Statistics, Jun 2017*. Retrieved from Australian Bureau of Statistics: <https://www.abs.gov.au/AUSSTATS/abs@.nsf/featurearticlesbyCatalogue/CCF53AA000E69954CA2582570013F5C6?OpenDocument>

AEC. (2011, January 24). *Enrolment*. Retrieved from Australian Electoral Commission: https://www.aec.gov.au/Elections/referendums/1999_Refendum_Reports_Statistics/Enrolments.htm

AIHW. (2019, August 30). *Eye health*. Retrieved from AIHW: <https://www.aihw.gov.au/reports/eye-health/eye-health/contents/how-common-is-visual-impairment>

Babich, N. (2016, March 27). *Using Card-Based Design To Enhance UX*. Retrieved from UX Planet: <https://uxplanet.org/using-card-based-design-to-enhance-ux-51f965ab70cb>

Baker, K. (2020, May 9). SUS Evaluation. (L. Wardroppe, Interviewer)

- Cherry, K. (2019, August 13). *How Average IQ Scores Are Measured*. Retrieved from verywellmind: <https://www.verywellmind.com/what-is-the-average-iq-2795284>
- Chowdhury, A. (2014). *Viral Voting*. London: WebRoots Democracy.
- Chowdhury, A. (2015). *Viral Voting*. London: WebRoots Democracy.
- Clarke, A. (2020, April 11). Design Walkthrough Evaluation. (L. Wardropper, Interviewer)
- Clarke, A. (2020, April 15). TAM Evaluation. (L. Wardropper, Interviewer)
- Clarke, B. (2020, April 13). Co-design Evaluation. (L. Wardropper, Interviewer)
- Clarke, B. (2020, May 26). Cognitive Walkthrough Evaluation. (L. Wardropper, Interviewer)
- Clarke, B. (2020, May 9). SUS Evaluation. (L. Wardropper, Interviewer)
- Clarke, B. (2020, April 15). TAM Evaluation. (L. Wardropper, Interviewer)
- Dobbins, C. (2020, May 12). Evaluating Usability – “Expert” or “Non-User” Evaluations. Brisbane, Queensland, Australia.
- Doran, T. (2020, April 15). Design Walkthrough Evaluation. (L. Wardropper, Interviewer)
- Fisher, C. (2019, June 12). *Australians are less interested in news and consume less of it compared to other countries, survey finds*. Retrieved from The Conversation: <https://theconversation.com/australians-are-less-interested-in-news-and-consume-less-of-it-compared-to-other-countries-survey-finds-118333>
- Forde, M. (2020, April 14). Co-design Evaluation. (L. Wardropper, Interviewer)
- Fowler, A. (2013). Electoral and Policy Consequences of Voter Turnout: Evidence from Compulsory Voting in Australia. *Quarterly Journal of Political Science*, 159-182. Retrieved from https://projects.iq.harvard.edu/files/westminster_model_democracy/files/fowler_compulsoryvoting.pdf
- Gerron-Wilcox, K. (2017, October 17). *Strategies to Effectively Display Large Amounts of Data in Web Apps*. Retrieved from esri: <https://www.esri.com/arcgis-blog/products/data-management/mapping/strategies-to-effectively-display-large-amounts-of-data-in-web-apps/>
- Goel, T. (2009, May 20). *AN EFFECTIVE DESIGN WALKTHROUGH: A STEP TOWARDS DELIVERING THE BEST DESIGN*. Retrieved from Project Smart: <https://www.projectsmart.co.uk/an-effective-design-walkthrough-a-step-towards-delivering-the-best-design.php>
- Gonzales, B. (2020, May 25). Heuristic Evaluation. (L. Wardropper, Interviewer)
- Gottschalk, F. (2019, January 31). *IMPACTS OF TECHNOLOGY USE ON CHILDREN: EXPLORING LITERATURE ON THE BRAIN, COGNITION AND WELL-BEING*. Retrieved from OECD: <http://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=EDU/WKP%282019%293&docLanguage=En>
- Gough, S. (2018, May 17). *The importance of great mobile app branding*. Retrieved from APADMI: <https://www.apadmi.com/blog/the-importance-of-great-mobile-app-branding/>
- Jones, N. (2017, October 22). *How to Conduct a Cognitive Walkthrough*. Retrieved from Interaction Design Foundation: <https://www.interaction-design.org/literature/article/how-to-conduct-a-cognitive-walkthrough>
- Katakam, A. (2014, October 9). *Map: How long does voting take in your state?* Retrieved from Vox: <https://www.vox.com/2014/10/9/6951251/map-voting-time-by-state>
- Li, B. (2020, May 25). Heuristic Evaluation. (L. Wardropper, Interviewer)
- Liu, J. (2020, May 8). SUS Evaluation. (L. Wardropper, Interviewer)
- Moore, M. (2020, April 13). Design Walkthrough Evaluation. (L. Wardropper, Interviewer)
- Moore, M. (2020, May 10). Time on Task and Think Aloud Evaluation. (L. Wardropper, Interviewer)

- Naik, N. (2020, April 15). Co-design Evaluation. (L. Wardropper, Interviewer)
- Naik, N. (2020, May 26). Cognitive Walkthrough Evaluation. (L. Wardropper, Interviewer)
- Naik, N. (2020, May 23). Heuristic Evaluataion. (L. Wardropper, Interviewer)
- Naik, N. (2020, April 15). TAM Evaluation. (L. Wardropper, Interviewer)
- Nielsen, J. (2012, January 15). *Thinking Aloud: The #1 Usability Tool*. Retrieved from Nielsen Norman Group: <https://www.nngroup.com/articles/thinking-aloud-the-1-usability-tool/>
- Nielson, J. (1994, November 1). *How to Conduct a Heuristic Evaluation*. Retrieved from Nielsen Norman Group: <https://www.nngroup.com/articles/how-to-conduct-a-heuristic-evaluation/>
- PayScale. (2020, February 28). *Average Accountant Salary in Australia*. Retrieved from PayScale: <https://www.payscale.com/research/AU/Job=Accountant/Salary>
- PNGTree. (2020, May 21). *Free People PNG Images*. Retrieved from PNGTree: <https://pngtree.com/free-people-png>
- Purwar, S. (2019, February 6). *Breaking down Fitts law for UX designers*. Retrieved from UX Planet: <https://uxplanet.org/breaking-down-fitts-law-for-ux-designers-542cabb48f9>
- Reed, J. (2020, May 9). SUS Evaluation. (L. Wardropper, Interviewer)
- Roberts, F. (2020, May 12). Time on Task and Think Aloud Evaluation. (L. Wardropper, Interviewer)
- Robertson, M. (2020, April 11). Design Walkthrough Evaluation. (L. Wardropper, Interviewer)
- Robertson, M. (2020, April 15). TAM Evaluation. (L. Wardropper, Interviewer)
- Robertson, M. (2020, May 8). Time on Task and Think Aloud Evaluation. (L. Wardropper, Interviewer)
- Sattler, J. (2020, May 24). Heuristic Evaluataion. (L. Wardropper, Interviewer)
- Sattler, J. (2020, May 8). SUS Evaluation. (L. Wardropper, Interviewer)
- Sattler, J. (2020, April 15). TAM Evaluation. (L. Wardropper, Interviewer)
- Sauro, J. (2011, February 2). *MEASURING USABILITY WITH THE SYSTEM USABILITY SCALE (SUS)*. Retrieved from MeasuringU: <https://measuringu.com/sus/>
- Sauro, J. (2019, May 7). *10 THINGS TO KNOW ABOUT THE TECHNOLOGY ACCEPTANCE MODEL*. Retrieved from MeasuringU: <https://measuringu.com/tam/>
- Skelley, G. (2019, September 19). *Just how many swing voters are there?* Retrieved from FiveThirtyEight: <https://fivethirtyeight.com/features/just-how-many-swing-voters-are-there/>
- Smith, J. (2020, April 13). Co-design Evaluation. (L. Wardropper, Interviewer)
- Smith, M. (2015, July 16). *Digital Trust in the IoT Era: 54% of people don't trust security protecting their info*. Retrieved from CSO Australia: <https://www.csosonline.com/article/2948583/digital-trust-in-the-iot-era-54-of-people-dont-trust-security-protecting-their-info.html>
- Song, H. (2020, May 25). Heuristic Evaluataion. (L. Wardropper, Interviewer)
- Sparkles, D. (2019, November 21). *Half of all Australian kids have hands on mobile phones, according to Communication and Media Authority survey*. Retrieved from ABC News: <https://www.abc.net.au/news/2019-11-21/phone-use-rises-among-australian-children/11722920>
- Statista. (2019, January 12). *Share of population who hold a bachelor level degree or above in Australia from 1989 to 2018*. Retrieved from Statista: <https://www.statista.com/statistics/612854/australia-population-with-university-degree/>

- Todorovic, D. (2008, August 13). *Gestalt Principles*. Retrieved from Scholarpedia:
http://www.scholarpedia.org/article/Gestalt_principles
- Wang, J. (2020, May 9). SUS Evaluation. (L. Wardropper, Interviewer)
- Wardropper, N. (2020, May 9). SUS Evaluation. (L. Wardropper, Interviewer)
- Williamson, L. (2020, April 10). Design Walkthrough Evaluation. (L. Wardropper, Interviewer)
- Williamson, L. (2020, May 10). Time on Task and Think Aloud Evaluation. (L. Wardropper, Interviewer)
- Zaloom, C. (2019, August 30). *How Paying for College Is Changing Middle-Class Life*. Retrieved from The New York Times:
<https://www.nytimes.com/2019/08/30/opinion/sunday/college-tuition.html>

Screen/Element Description	Usability Issue	Heuristic Category	Probable Effect On User	Impact	Frequency	Persistence

Thanks.

Heuristic Evaluation Results

Expert 1 – Nikhil Naik

Screen/Element Description	Usability Issue	Heuristic Category	Probable Effect On User	Impact	Frequency	Persistence
First Using App	Lack of tutorial screen or help icons. Since voting has a range of user age and technical abilities, should have a maybe an initial tutorial screen showing how and what the UI elements are and do. Or have help icons that are interactable throughout the entire voting process.	Help & Documentation	Can't continue or struggle with voting.	High	Common	Very
Settings Language	Since voters can contain a range of individuals in society where people have different languages for speaking and reading. Should	User Control & Freedom	If English not spoken/read language not possible to continue.	High	Rare	Very

	coincide with Nielsen's usability principle of inclusivity by allowing language changes.					
Personal Details entry fields	When entering data for personal information, Android/IOS design guidelines include error trapping methods to reduce errors when entering data. This includes minimizing text entry fields, should explore use of drop-down elements for age. As well as faded examples of other fields such as email, PIN, home address and phone number.	Error Prevention	Struggle to input information, give up if not able to enter correct field.	High	Rare	Not
Navigating back to home page	Even though home page is accessible from any page, it is not always visible to the user. When on the results page the home icon is available which is good, however every other page has a back button. From Neilson's usability principles it important for users to be able to return to the home page without difficulty, a back button is less intuitive then a home icon.	Consistency & Standards	Confused or overwhelmed if not able to return to the home page.	Low	Common	Very
Font	Looking at guidelines for IOS	Consistency & Standards	Doesn't feel like other apps	Low	Common	Very

	and Android design the standard font is San Francisco for IOS and Roboto for Android. Should stick to one of these for design guideline coincidence.					
App Icon	Lacking application icon, important for user retainability and recognition of the name of the app. Should be designed, since important for users first opinion on application.	Consistency & Standards	Might not use app	High	Common	Very

Expert 2 – Jack Sattler

Screen/Element Description	Usability Issue	Heuristic Category	Probable Effect On User	Impact	Frequency	Persistence
Usability Settings	Lack of options for those with disabilities and/or impairments	User Control & Freedom	Those with disabilities disadvantages when using the app	High	Rare	Not
Font	Font doesn't appear to match guidelines	Consistency & Standards	Not consistent and noticeable	Low	Common	Very
Notifications	No notifications to alert user of vote time	Provide immediate notification of application status.	People will not remember when to use the app	High	Common	Very
Language	Doesn't include diversity of cultures	User Control & Freedom	Many non-english speakers	High	Rare	Very

Expert 3 – Benjamin Gonzales

Screen/Element Description	Usability Issue	Heuristic Category	Probable Effect On User	Impact	Frequency	Persistence
Results Screen	Text could be larger	Consistency and standards	Not customisable for those with poor	Low	Rare	Very

			eyesight			
Help Icons	No information displayed	Intuitive interfaces make for easier learning	User's with less experience may struggle without detailed help screen	Low	Rare	Very
Colour	No options to alter colours to night mode	Consistency and standards	Disadvantages a certain user group	Med	Rare	Very
Voting	Buttons to change preferences of candidates could be more profound and space apart	User control and freedom	Makes it hard to vote for candidates	Med	Common	Not Very
Candidate Information	Text is not justified	Consistency and standards	User annoyance	Low	Common	Very
Candidate Information	No option to hide large sections of text	User control and freedom	User annoyance	Low	Common	Very

Expert 4 – Brighton Li

Screen/Element Description	Usability Issue	Heuristic Category	Probable Effect On User	Impact	Frequency	Persistence
Vote Submitted Icons	I think you could make the vote submitted icon more clear at what it is achieving, as it kind of looks out of place and doesn't add much to the screen.	Consistency and standards	Confusion	Med	Common	Very
Language Options	I think there should be more options for the user to change settings such as language, because at the moment you are discounting non-English speaking users.	User Control & Freedom	Unusable for non-English speaking users	High	Rare	Very

Settings	There needs to be more options for people with disabilities, including TTS or alternate font size. Currently you have a settings icon but it doesn't outline what can be altered	User Control & Freedom	Doesn't aid people with disabilities or impairments	High	Rare	Very
Voting Page	Text below the heading is bolded whereas rest of subheadings are not	Consistency and standards	Annoyance	Low	Rare	Very

Expert 5 – Hans Song

Screen/Element Description	Usability Issue	Heuristic Category	Probable Effect On User	Impact	Frequency	Persistence
Opening App	No tutorials or pop-up information to inform the user how to use the app. This needs to be a feature since voting is such an important task and is required by the Australian public. Many users may find the app complex and therefore won't vote.	Help & Documentation	Difficulty using the app for its intended task	High	Common	Very
Font / Font Size	Font is not aligned with ios guidelines and cannot be altered in size.	Consistency and standards	Confusion / Difficulty using the app	Med	Common	Very
Map on Results Page	The map is very complicated to look at and has no indication that a user can interact with it. It probably needs some sort of labelling or a simpler design.	Aesthetic and minimalist design Intuitive interfaces make for easier learning	Confusion	Med	Common	Very

Icons	System does not have any icons or branding	Consistency and standards	Confusion	Low	Common	Very
-------	--	---------------------------	-----------	-----	--------	------

Cognitive Walkthrough Evaluation Protocol

Evaluation ID User Test 007	
Aims/Purposes	Conduct a Cognitive Walkthrough evaluation sessions with an expert and typical user to determine gaps between the gulfs of execution and evaluation.
Date/s	23-28 May 2020
Creator	Lachlan Wardropper

Find the prototype at: <https://xd.adobe.com/view/0c77e38c-2f4d-4d89-61fe-bd3af0054695-7a46/>

Cognitive Walkthrough Evaluation Instructions

1. Get familiar with the prototype linked above
2. Complete the tasks specified in the table and for each one simple answer “yes” or “no”. If you answer right a small explanation in the *Issues* column.

Task	Action Sequence	Will the user try and achieve the right outcome?	Will the user notice that the correct action is available to them?	Will the user recognize the action as the correct one?	If the correct action is performed, will the user understand progress is being made towards their intended outcome?	Issues
User views John Doe candidate information	Enters home screen					
	Complete required profile information					
	Navigate to candidate information page					
	View John Doe page					

User votes for preferred candidates	Navigate to voting page					
	Preference votes of candidates					
	Submits vote					
	Return to home page					
User checks results in New South Wales	Enters results page					
	Clicks on geographical map					
	Return to results page					
	Navigate through menus to NSW results					

Heuristic Evaluation Results

Respondent 1 – Nikhil Naik

Task	Action Sequence	Will the user try and achieve the right outcome?	Will the user notice that the correct action is available to them?	Will the user recognize the action as the correct one?	If the correct action is performed, will the user understand progress is being made towards their intended outcome?	Issues
User views John Doe candidate information	Enters home screen	yes	yes	yes	yes	
	Complete required profile information	yes	yes	yes	no	Not clear that they can't continue process if not complete
	Navigate to candidate information page	yes	yes	yes	yes	
	View John Doe page	yes	yes	yes	yes	
User votes for preferred candidates	Navigate to voting page	yes	yes	yes	yes	
	Preference votes of candidates	yes	yes	yes	yes	

	Submits vote	yes	yes	yes	yes	
	Return to home page	yes	yes	yes	no	Process is complete at this point
User checks results in New South Wales	Enters results page	yes	yes	yes	yes	
	Clicks on geographical map	no	yes	yes	yes	Confusing map that is not labelled well
	Return to results page	yes	yes	yes	no	Task has been achieved at this point
	Navigate through menus to NSW results	yes	yes	yes	yes	

Respondent 2 – Bella Clarke

Task	Action Sequence	Will the user try and achieve the right outcome?	Will the user notice that the correct action is available to them?	Will the user recognize the action as the correct one?	If the correct action is performed, will the user understand progress is being made towards their intended outcome?	Issues
User views John Doe candidate information	Enters home screen	yes	yes	yes	yes	
	Complete required profile information	yes	yes	yes	yes	
	Navigate to candidate information page	yes	yes	yes	yes	
	View John Doe page	yes	yes	yes	yes	
User votes for preferred candidates	Navigate to voting page	yes	yes	yes	yes	
	Preference votes of candidates	yes	yes	yes	yes	
	Submits vote	yes	yes	yes	yes	
	Return to home page	yes	yes	yes	no	Doesn't naturally seem part of the process

						considering the other steps
User checks results in New South Wales	Enters results page	yes	yes	yes	yes	
	Clicks on geographical map	yes	no	yes	yes	You can press any point in the map and it will move to the NSW menu
	Return to results page	no	yes	yes	no	The task is complete so they wouldn't complete this step
	Navigate through menus to NSW results	no	yes	yes	yes	Not explicit in labelling that button will take to NSW