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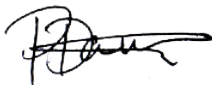
Disclosure:	I declare that this assignment is all my own work and that I have acknowledged all materials used from the published or unpublished works of other people. All references have been duly cited.		
Student's Signature:		Date:	17/05/19

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1. Introduction

The following report documents the updated prototype designs for the faculty of engineering, computing and architecture commissioned by Dr Nik Whitehead for the User Experience Design module.

The report firstly discusses, in detail the updates made to the prototype as a direct result of the user testing and their adherences to usability and user experience best practices. The updates are then subjected to more user tests, with the addition of system usability scales and a user experience questionnaire. The results are then analysed to see if the changes made have had a negative or positive effect on the usability and user experience of the prototype.

Data analytics in respect to mobile applications are then discussed to discover how user data collection could help improve the UWTSD FACE app. Finally, a reflection section critically reviews the whole process undertaken over the two assignments.

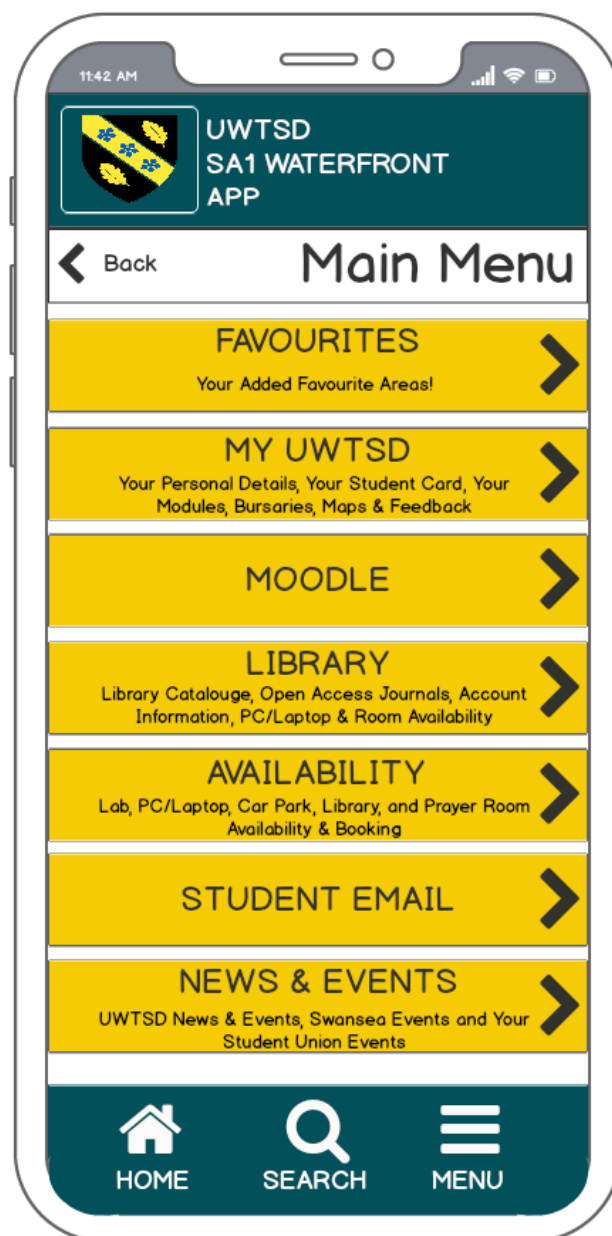
The report is then concluded, which precedes a full reference list, bibliography and appendix containing the user test scripts and summarised results.

2. Colour Prototype Designs

The updated colour storyboards, in their entirety can be found in appendix A. Section two will contain screenshots of the main UWTSD App screens followed by a detailed look at the changes made to the app, resulting from the user testing conducted in assignment two.

The colours used for the application are consistent with UWTSD branding; green (#00545E) and yellow (#F7CF00). These colours were chosen as colour is considered one of the most important and effective ways to communicate brand identity, facilitate recognition and evoke brand association [1][2].

Main Menu Screen



Home/Favourites Page

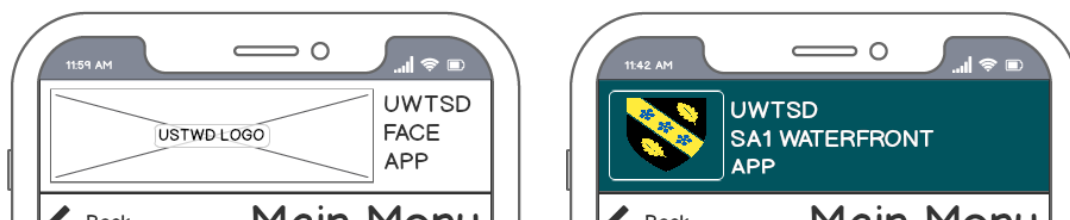


2.1 Changes Made

The user testing conducted in assignment two [3] found a total of six problems with the IA and overall design of the application. The reason for this low number of problems discovered with initial designs can be accredited to the use of known IA best practices, such as card sorting [4], as well as the use of the known design patterns [5] which was discovered through user research to be familiar to current UWTSD students; the target user group for the application.

The following sections document the changes which have been made, why they have been made and how they relate to best UX practices.

2.1.1 Renaming of App



Semester two's assignment briefs have been explicit in their instruction to design a mobile phone application for FACE (Faculty of Engineering, Computing and Architecture) students, however, as stated in section 8 of assignment two [3], user research through questionnaires and user testing through interviews discovered that many students who were not part of this faculty were using the faculties facilities and would directly benefit from using this application, and should therefore be included in the application target user group.

It is for this reason that the application has been renamed to 'UWTSD SA1 Waterfront App' to ensure that the app is inclusive for all students who use these campuses' facilities. Justification for this drastic change is provided by Marsh [6], who states that users have built in psychological needs, things which they want; he lists 14 universal motivations which are useful when considering good UX design. Three of these influenced the renaming decision:

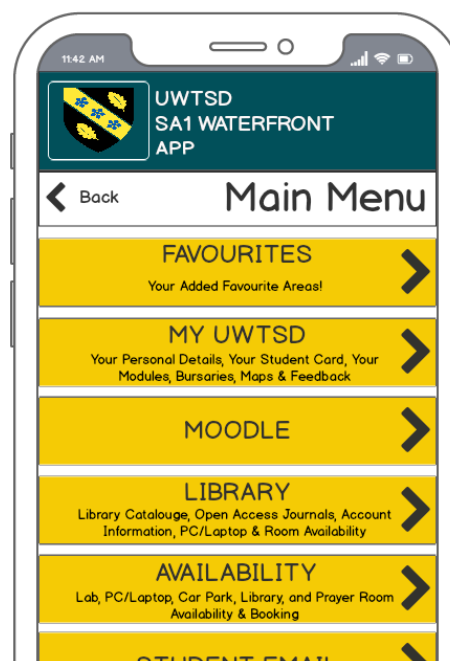
Affiliation – users and human's in general like '*belonging*' to someone or something and enjoy being part of a group or something bigger. Therefore, to purposely exclude other users of this application, like education and business students, who clearly have a need for its features, it would damage their affiliation to the university and possibly invoke a psychological reaction of feeling '*unwanted*' or '*not good enough*'.

Status – by exclusively calling the app ‘UWTSD FACE App’ this is giving the impression to all UWTSD students outside of FACE that this application is not for them, which in turn will diminish, not only their status within the university, but in the long term, will also damage the university’s status as it will be seen as the university not being inclusive to all user groups of the same faculty. It could be argued that this would heighten the ‘status’ of users who were inclusive of the app, however, this may cause divides within students.

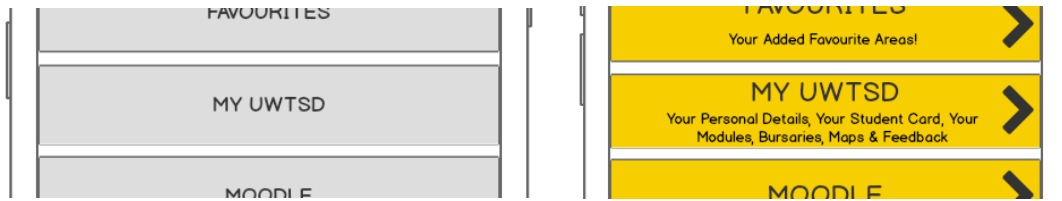
Justice – all humans like to see justice served, therefore, students who would feel excluded from the app due to its name would feel a great sense of ‘injustice’ towards the university and possibly feel that they are not good enough to be part of the exclusive FACE app *club*, this in turn would damage the university’s reputation.

These motivations all provide evidence that renaming the app is a good design decision to enhance the user experience of not just the application, but the whole university.

2.1.2 Availability Section, Labelling & Chevrons



Assignment two concluded that the ‘Availability’ section of the app, which allowed students to check on availability of Lab’s in the IQ, PC’s and Laptops etc., was too difficult to find due it being placed under the ‘My UWTSD’ group in the IA. All users felt that this connection was too ambiguous, and, as all the availability features made it onto the ‘most desirable’ features wanted list (section 5.2.1.1, assignment two), two in the top 10, it can be concluded this will be a heavily used feature, and therefore it has been made available in the top 10 items in the main menu.



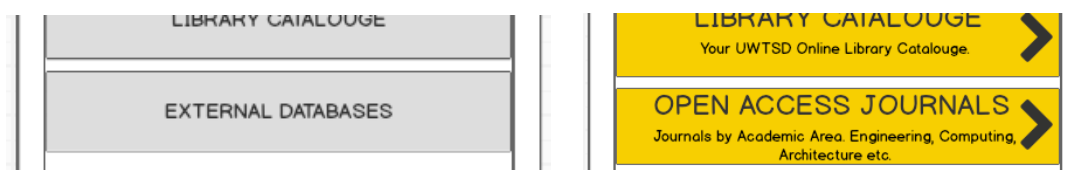
To further eliminate this ambiguity of lower-level menu items residing under higher level ones, labelling has been added to all buttons considered to have some ambiguity, for example, the ‘My UWTSD’ section contains many different sub-sections which may not, at first glance, feel related to this section’s heading.

Although the app’s design followed design patterns which promoted safe exploration [7], students of UWTSD are often very busy and under pressure, meaning they will become frustrated if they have to explore a system to find something, a sentiment echoed by Krug [8], who states; when users cannot find what they are looking for, frustration ensues and they leave. Krug [8] also offers advice, he adds; buttons and search boxes should be labelled correctly to convey a ‘*step-by-step*’ process of where the user *wants* to go. Therefore, labelling has been added below each button which requires it, to guide the user through the navigation process.

The final change which is evident in the two previous screenshots is the addition of a chevron to denote that the button, is, in fact, a button, which leads somewhere and can be tapped. This and the previous labelling change follows one of Krug’s [8] first laws of usability; ‘*Don’t make user’s think*’, meaning that when users have to stop and think about what a control does or how they will get to where they want to go, they ultimately will have a bad experience with that system.

The chevrons were also added as the main menu and sub-section menus utilise the list menu design pattern [5], as stated in section 6.1.2 of assignment two. This pattern should include the use of chevrons to communicate to the user that the button is tappable.

2.1.3 Renaming of Library Databases



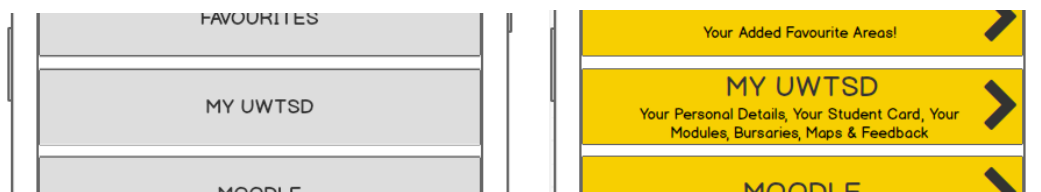
Two out of the three users tested in assignment two stated that the naming of the external library resources did not accurately denote the content it represented, again, relating back to

Krug's [8] first law of usability; users had to think about what the '*external databases*' labelling meant.

It was originally labelled '*External Databases*' as on the UWTSD website, these journal resources are found (eventually by googling them) under a heading called '*Databases by Subject*', as it was considered a close match, however, as two users found difficulty relating, this has now been updated to one user's suggestion of '*Open Access Journals*'.

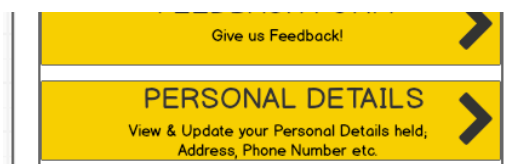
It could be considered that this does represent the content the label is trying to denote, however, user testing of this naming convention will be the only way to provide proof, as UX practices would argue that using consistency across all systems owned and operated by the same company would provide the greatest user experience and make it easier for them to adapt to a new system, on a new platform, through familiarity [1].

2.1.4 Personal Details Section



Two thirds of users felt that the '*Personal Details*' section, which allows users to update their details held by UWTSD, should be moved to a higher-level menu, out of the '*My UWTSD*' section due to its importance, however, upon reflection of these comments it has been considered that, although important, students will not be using this feature of the app as regularly as they would other main menu features, such as Moodle and email.

Furthermore, referring to Garret's [1] notion that familiarity throughout systems make them easier to use, it is considered that '*My UWTSD*' relates to the current system where students can update their details called '*My TSD*'.

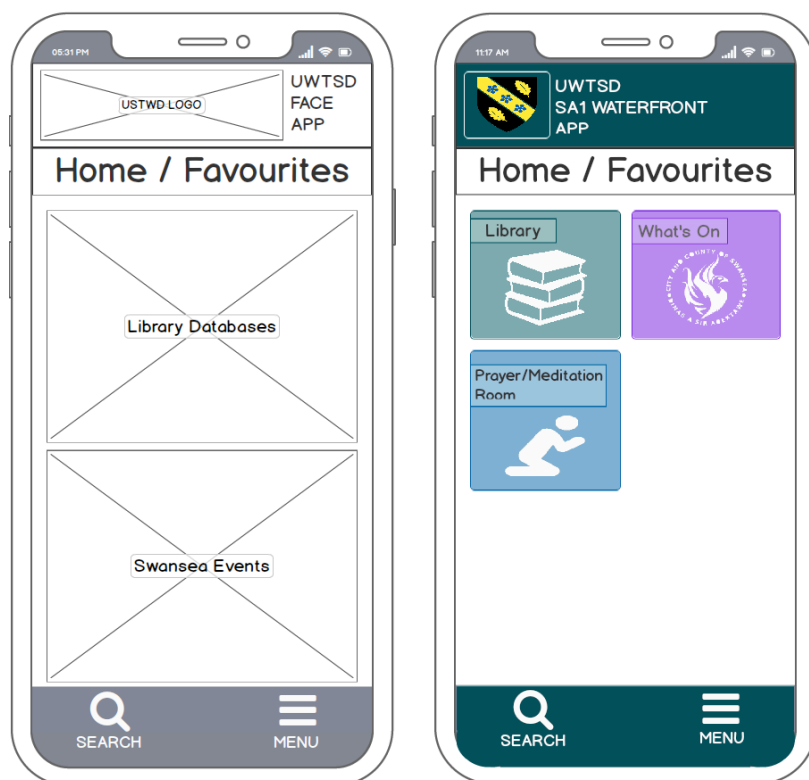


Therefore, the '*Personal Details*' section has not been moved, however, utilising the new labelling system, and taking note on the importance of this feature, the '*My UWTSD*' button is now labelled with '*Your Personal Details*' first in the labelling order. Additionally, when a

user navigates to the 'My UWTSD' section, further labelling is present to guide the user to this feature. Again, user testing of this change, or lack of it, will provide evidence to justify this decision.

2.1.5 Smaller Tiles on Home Page/Favourites

100% of the tests showed that the smaller tiles used for the favourites page should be of the smaller variety. One user commented that having bigger tiles would possibly make them scroll down more to find their favoured items, other users simply commented that it looked 'neater'.



If users have to scroll, what is known as, the 'scroll of death', this could have a profound effect on the apps loading times. One survey by *Kiss Metrics* [9] states that 40% of users will abandon a system if loading times are slow, furthermore, Loranger [10] of the NN group states that the infinite scroll is not best suited to goal-orientated tasks.

The above facts and statements provide good evidence to justify the use of the smaller tiles as larger tiles would mean less tiles could fit on a screen, meaning more scrolling, leading to greater load times. Furthermore, users will be specifically be looking to carry out goal-orientated tasks, and quickly, providing further justification for the smaller tile layout.

It is also considered that comments about the user interface simply being '*neater*' are justifiable through evidence by Morville [11] who states, in his UX honeycomb, that a product should be '*desirable*', meaning that the visual aesthetics should be attractive and easy to translate. The IxD [12] foundation add that the more desirable a product is, the more likely users are to use and recommend it, as well as creating a desire for it amongst friends, something which could prove very powerful on a university campus due to the close social circles and need for *affiliation* and *status* [6].

2.1.6 Student's Union Branding



The final change was recommended by one user; to represent the student's union branding better, which does conform to Garret's familiarity theories. This change has been implemented on the screen which employs the list-menu pattern, however, it is considered that now an icon is used for the union, other icons should be considered for the other items in the list-menu pattern, however, there is a risk of the menu items causing an '*information overload*' [13][14] and it may be best to simply use this icon on a tile, when/if, the user saves this section as a favourite.

The preceding user testing will help determine if this is or isn't a problem or whether the user would prefer every list-menu item to have a representative icon.

3. User Testing

Referring back to the assignment two user testing methodology, user testing will be conducted using persona matched test participants who will carry out tasks this user group would usually perform [15], [16], in this case, the user tests will be very similar to what was used before, albeit on the updated interfaces to prove if the changes have improved the user experience and usability of the application.

As before, time constraints will force the use of 3 user tests, the minimum recommended by Krug [17].

3.1 User Testing Process

The characteristics that every usability test should share [18] were stated in assignment two [3], and for reference, can be found in appendix B. The characteristics which have changed are shown below, for relevance to this assignment.

1. The goal is to improve the usability of the product or system.

The goal of the testing in assignment three is to critically test and analyse the changes made a direct result from the first round of user tests.

5. Data is analysed, problems are diagnosed, and recommendations are made to fix them.

The collected answers and data will be evaluated, and any problems identified, and fixes and recommendations suggested for the future.

In addition to user test interviews to gain qualitative data and system usability scales to gain quantitative data, as used before, for this assignment, an additional questionnaire, from *UEQ* [19] will be used to measure and record quantitative data regarding the user's experience with the system.

The test script and questionnaires, along with the SUS and UEQ templates can be found in the appendix C.

3.1.1 User Test Script Explained

The user testing script has been modified from the user testing script supplied by Krug [17] and the tasks set are designed to hone in on the changes made, whilst ensuring the tasks would be typical tasks users matching the personas would carry out, with the addition of catering for the extended user group the renaming has brought.

i. User Test Preamble

This section of the script is designed to relax the participant by welcoming them, explaining the setup, what the test is for and how it will be conducted. It also reminds them that they are not being tested, the system is; something which is important to gain valuable information.

ii. Pre-Test Interview

The pre-test interview helps gain an understanding of the type of user who is participating; their age group, course studied and their phone application usage. This information will help when comparing each user to the target user group, specifically useful now the name of the app has been changed. Furthermore, it helps participants feel comfortable and willing to open up, and it shows that the facilitator is listening.

iii. The Test Tasks

- 1. I am going to show you two versions of the entry page to the app, looking at the header of the entry page, could you tell me which one you prefer?**

As the name has been changed, this question is designed to get the user to consider which one they prefer, without trying to directly point this out, however, a note has been added to push the user on the name if they have not noticed it.

- 2. Could you please, from this entry page, open the menu. Once open, could you tell me how you feel about it?**

This question is designed to gauge the user's feelings about the main menu, in hope users will place specific focus on the new labelling, the smaller main label text and the new chevrons.

- 3. Could you try and navigate to the section of the app which would allow you to update your personal details held by UWTSD?**

In the previous assignment, navigation to this section was difficult, and many users felt it should be moved. As stated earlier, it has not been moved, therefore, this question is designed to test if this was the right decision and if the labelling used instead, works.

4. ***Could you try and navigate to a section in this app where you could find architectural journals from the UWTSD online library?***

The naming of the 'External Databases' section of the application proved to be a problem last time round, therefore, this question is designed to firstly, re-test the navigation to the library area and then discover if the new, user suggested, name of 'Open Access Journals' is suitable.

5. ***Did you find that easy? Was it clear how you would achieve your goal?***

This question tries to gauge how easy the user achieved their goal with the current navigation and labelling, with the hope of gaining insight into how any paths to the library could be improved.

6. ***What do you think of the naming of the journals section?***

An unusually specific question aimed at discovering the user's thoughts on the new name for the journals section.

7. ***Could you now add this page to your favourites?***

To test the ease users can add a page to their favourites. As users found no problems with this task in the last round of tests, it is only included here to ensure the flow of the test through the different screens.

8. ***Could you now navigate back to the home page?***

To test the tab-menu pattern employed and the familiarity of the icons.

9. ***Can you now navigate to a section in the app which tells you about UWTSD student's union events?***

An improvement made through testing was the addition of extra union branding to the menu. This task is designed to see if the users pick up on this extra branding and if they have any further suggestions about extra branding throughout the rest of the application.

10. ***Could you again add this page to your favourites and navigate back to the home page please?***

As question seven.

11. *What do you think of the tiles used to store your favourite links?*

With the home page now employing the smaller favourite tiles, suggested from the last round of tests, this question specifically asks users what they feel about the tiles and if the layout is familiar.

12. *Could you now find a section in this app which tells you of the IQ buildings prayer room availability?*

Navigation to the availability section proved difficult last time round, users suggested it be moved. It has been moved to the main menu and labelled accordingly. This task is designed to see if these changes have made this section easier to navigate to.

13. *Did you find that easy to find? Was it clear how you would achieve your goal?*

As question five.

14. *Could you now add this page to your favourites and navigate back home, please?*

As question seven and ten.

15. *What do you think of the tiles used to store your favourite links here, now the layout has changed slightly?*

As question eleven.

3.1.2 System Usability Scales

System usability scales, invented by Brooke [20], they are being used in this assignment as they use a Likert scale to give a subjective, quantitative measure in terms of usability of the system.

The SUS scale used is a modified version from *measuringux.com* [21] and can be found in appendix C.

3.1.3 User Experience Questionnaire

The user experience questionnaire by Schrepp *et al.* [22] is used as it provides a quick, simple and immediate way of comprehending the users experience with the application and will supply the quantitative data needed to prove if this experience is positive or negative.

The scoring of items is scaled from -3 to +3 with minus representing negative scores and plus representing positive, with zero being neutral. The UEQ has 26 items which measures on 6 scales: attractiveness, perspicuity, efficiency, dependability, stimulation and novelty [23].

The UEQ used and marking spreadsheets have been downloaded from ueq-online.org [19] and can be found in appendix C.

3.2 Analysis of User Test Results

The user test scripts have been analysed and the key points tabulated for easy reference. These tables are found in appendix D and have been used to write up the following analyses.

3.2.1 Test Summary

Summarising the test results has showed that overall, the changes to the application have had a positive effect. Firstly, no participants found any issues in completing any of the locating tasks which can be directly attributed to re-organising of the IA for items which caused problems last time as well as the sub-labelling, as all participants used this as a guide to achieve their goal, however, 2/3 participants commented the labelling and sub-labelling text should be larger.

The decision not to move the '*Personal Details*' section has also been justified by the user tests. Section 2.1.4 stated that although users requested this be moved, the design team felt that with better labelling finding it would not be a problem, which has proved to be correct, with no users having issues in locating it.

The renaming of the app has proved somewhat successful with 2/3 participants preferring the new name, but, more importantly, participant three commented that the new name could be associated with the campus more meaning it would feel more inclusive to all UWTSD students, however, one participant did think it was too long and possibly not rememberable so another re-think of this may be advised.

The design patterns used were proved, again, to be successful with no issues found in using the home/menu buttons as well as the favourites spring board pattern and the menu's list-menu pattern. The addition of the chevrons has also proved to work as one participant commented that they look exactly like buttons, something which is difficult to achieve on paper. One participant commenting the design was better than the existing UWTSD app!

Finally, section 2.1.3 stated that familiarity with the existing websites naming may be the best convention, however, the renaming of the journals section of the app proved popular with 2/3 participants who stated that because the name now contained the word '*journals*' it was clear and obvious, although, one did comment that the internal library also lists journals, so they became confused as to which one they wanted, possibly as they were looking for the same naming convention used on the website.

3.2.2 Problems & Recommendations

Although the improvements made have made a big difference, the participants did have suggestions. Firstly, the colours of the application were commented on negatively by 2/3 participants, this is something the design team agrees on; although the colours represent the UWTSD branding it is recommended that the new, light blue, dark blue and white branding (shown below) is used to bring the app up to date and make it more aesthetically pleasing, which will promote desirability and credibility.



Secondly, with 2/3 participants commenting the labelling and sub-labelling was too small, it is recommended that the font sizes used should be enlarged. This change could be made in addition with one suggestion that stated the buttons were too thin and there was no need for the white space between them; implementing this change would allow more room for larger labelling text.

The naming of the app and the naming of the journals section has proved successful, but some ambiguity still remains, therefore it is recommended that these areas of the app be re-tested with the updated branding and with more users to accurately gain insight.

Recommendation List

- Update colour scheme to new UWTSD branding.
- Increase button size & remove white space in-between.
- Increase labelling and sub-labelling.
- Re-test app with new names after change of branding.

3.2.3 System Usability Scores

<i>Test</i>	<i>Participant</i>	<i>System Usability Score</i>
1.	<i>Participant One</i>	97.5
2.	<i>Participant Two</i>	92.5
3.	<i>Participant Three</i>	100
	<i>Average</i>	96.6

Table 1 - System Usability Score Results

The system usability scores shown in table one provides a quantifiable insight into the usability of the app. With a score of 96.6 average, and the positive comments in section 3.2.3.1, it can be concluded that app's initial prototype design could be put forward for development.

3.2.3.1 Additional SUS Sheet Comments

Participant One

"Clunky in some areas, overall good consistent design. Easy to navigate and find what you're looking for. Accommodates all levels of IT capacity, easy for everyone to use"

Participant Two

"Should consider a different colour scheme. Particularly liked the favourite tiled view, but main menu button labelling and sub-labelling text too small. Good overall."

Participant Three

“Visually easy to use, colour coding of the favourites very useful, very clear and concise labelling with logical location of the features”

3.2.4 User Experience Scores

Table two shows the user experience questionnaire scores, broken down into the 6 different scales. These scores have then been averaged and converted into a percentile rating for analysis. It is worth noting that the method of analysis may not be the best or correct interpretation of the UEQ however, time constraints did not allow for thorough research into this very valuable testing technique.

Attractiveness – the designs scored fairly low on this scale (44%), however, given the app’s colour scheme is poor and is mainly for productivity and is designed to be more functional rather than beautiful this score is considered acceptable.

Perspicuity – this is the measure of how easy the product is to learn and become familiar with, therefore, the score of 89% is classed as excellent. This high score is owed to the use of IA best practices and the use of design best practices.

Efficiency – measuring the effort required for users to solve tasks, the score recorded (72.3%) is acceptable, however, given the app is designed for users in a rush, the aim should be to improve this score through further improvements.

Dependability – referring to a user’s perceived control of the interaction, again, an acceptable score of 72.3% but given the apps genre, again, the aim should be to improve this score.

Stimulation – measuring the excitement users gain from a product. A low score of 36% was expected here as this app is a productivity app is not designed to be ‘exciting’.

Novelty – the handbook states this refers to the innovation and creativity of the product, therefore a score of just 16.7% is disappointing as this app is designed to offer students services that are considered cutting edge which have been implemented directly from their suggestions, however, Schrepp [23] does state that this scale is for *hedonic* qualities; it is measuring non goal-directed aspects of a product, meaning that this low score may be misrepresented due the app’s goal-orientated purpose.

<i>Test</i>	<i>Participant</i>	<i>Attractiveness</i>	<i>Perspicuity</i>	<i>Efficiency</i>	<i>Dependability</i>	<i>Stimulation</i>	<i>Novelty</i>
1.	<i>Participant One</i>	1.00	2.75	1.25	2.00	1.00	0.75
2.	<i>Participant Two</i>	2.00	2.50	2.25	2.00	1.25	0.75
3.	<i>Participant Three</i>	1.33	2.75	3.00	2.50	1.00	0.00
	<i>Average</i>	1.44	2.67	2.17	2.17	1.08	0.5
	<i>Percentage</i>	44%	89%	72.3%	72.3%	36%	16.7%

Table 2 - User Experience Test Results

3.2.5 Conclusion

In conclusion, the changes made to the application from the testing in assignment two have had a big impact in improving the system as the current tests have presented far less usability and user experience problems.

The addition of the system usability scales and user experience questionnaire has also proven invaluable in providing evidence that the prototype is suitable to go to the next stage of development, with the recommended changes implemented, and be subjected to further user-tests.

It would however, have been very beneficial to have included the SUS and UEQ tests from the start as this would have allowed for comparison of results for further analysis which would provide a deeper understanding of the usability and user experience of the application. It is recommended that these tests be conducted at every future stage.

4. Data Analytics

Modern smartphone users are increasingly using mobile apps to access internet based services, instead of web browsers [24] and a study by Zhao *et al.* [25] identified 382 distinct types of smartphone users, therefore, understanding smartphone app users is considered fundamental for producing better human computer interactions with smartphones and their applications [25], [26].

The best way to understand user's behaviour whilst using smartphone apps is to observe them and or collect data by tracking their usage [27]. This data is desirable, not only to the marketing industry, but can also be a vital tool for improving user experience of apps, and even power management of the smart phones which they operate on [28][29][30].

In terms of user experience, it would be beneficial to be able to track how long a long a user was using the app and why, this would help determine if the user was spending a long time on the application through enjoyment or frustration, and by tracking their taps, it would be possible to hone in on problem areas in the information architecture.

Tracking which features of the application would also provide invaluable information about the IA structure; if it was known which features were being used the most then these could be prioritised in the navigation of the app; although the UWTSD app designed does allow for customisation of the app's navigation, a study by Yan *et al.* [31] discovered that 50% of app engagement lasted only 30 seconds, something branded app *micro-usage* by Ferreira *et al.* [32], suggesting that automatically organising the IA for the user may be beneficial through their lack of time to organise it themselves.

Location based tracking could also prove beneficial in providing an increased UX, for example, Liao *et al.* [29] propose dynamically predicting which apps will be used to save battery consumption. This idea could be extended to the UWTSD app; by using user location information in and around the campus, the app could notify the user of useful features related to the area of the university they were in, this would provide a streamlined service to the user as well as an increased battery life, as proposed by Liao; battery life being the pain of many a smartphone user. These combined would enhance a user's love and affiliation to the app as well as decreasing pain [6].

Despite the benefits of mobile app usage data collection, there is limited public research available on users application behaviour [33]. Smartphones can collect data in numerous ways; location tracking, battery life, Wi-Fi and Bluetooth usage and even distortions in

speaker-microphones can be used to identify devices [27]. Application usage, however, up until recently has also been limited to collection of quantitative data [33], which is valuable data, however, to truly improve the user experience of an application, analytic software needs to be able to measure and collect qualitative data to answer the *why*'s and provide emotional response data through their opinions, which would only be achievable by recording users voices.

This kind of data collection, however, would prove an infringement on personal rights, with so much personal data being collected already through the web and other applications. Furthermore, many users unaware that their mobile devices, and their apps are tracking their usage through quantitative means; Shklovski *et al.* [34] stating that users were surprised by this fact and it left them feeling violated in creepy ways, meaning adding qualitative data tracking to this would have a detrimental impact on customers trust and usage of the application.

Therefore, for this reason and ones previously stated, it is recommended that qualitative data be measured through ratings questionnaires and reviews on the app, which users can voluntarily partake in, however, one-on-one user-testing is still considered the gold standard for collecting qualitative data from the target user group.

5. User Experience Reflective Evaluation

The design process employed for the UxD module's assignments has endeavoured to follow industry best practices wherever possible, one of these best practices is the involvement of the user from the beginning, something which was found to have upmost importance in my final year project [35].

I involved the user immediately in assignment one when I gathered subjective, qualitative data through surveys conducted with UWTSD students. The IxD [36] state that field studies should be conducted on the target user group, and although this was my intention, upon conducting research I realised that the target audience for the FACE app was much larger than the brief stated. These findings were supported further through the user testing, therefore, I took the design decision to rename the app to enhance its inclusiveness, as stated in section 2.1.1.

After the feature list was drawn up through surveys, a card sort ensued to structure the IA, however, due to time constraints, this was not conducted using a group of target users, which is recommended [4], meaning less accuracy. This was proved to be the case as the main usability problems found with the first prototype were feature items organised under headings which users did not expect, reinforcing this was the fact that all users highlighted the same features.

These changes, along with others were implemented in assignment two, where one change in particular caused conflicts between usability and user experience, and by the response from the users during testing it will continue to; the labelling of the text. From a usability perspective, the labelling worked perfectly, guiding users to achieve their goals, but from a user experience perspective, the labelling made the app look too cluttered and busy. This was evident through the user testing; one user explicitly commented that the main menu and buttons on each screen looked too '*busy*' and '*clunky*', however, when pressed on how they achieved their goal of finding particular sections of the app, in contradiction, they confirmed that they used the labelling to guide them.

The colours of the app used also cause conflicts; research in shows that using colours which match the branding of the company will promote a brands image, facilitate recognition and brand association [2], however, 2/3 users did not like the colour scheme, and choosing the wrong colours can have a negative emotional effect [37] on your apps identity, affiliation and status, in turn giving a bad user experience.

The key to the usability and user experience issue is balance. Balance between these facets of user experience is what has made the conceptual honeycomb model by Morville [38] so successful. The IxD [12] foundation state that this balance is critical to the success or failure of a product or system, something which is evident through my testing results; on the one hand, users want something which looks visibly appealing to adhere to the *credible* and *desirable* facets of the honeycomb but also need their system or product to be usable to adhere to the *useful*, *usable*, and *accessible* facets of the honeycomb. Only by finding a balance between all UX facets will a product or system be completely *valuable* to its intended user group.

6. Conclusion & Recommendations

The following report has first documented the changes made to the app prototype through findings from user testing. The user testing process has then been repeated, with the addition of SUS and UEQ scales to add quantitative data to the discussion. Mobile data analytics have then been discussed along with their ethical place in today's society. Finally, the prototype design process on a whole has been reflected on with key clashes between usability and UX identified.

The design process on a whole has been a successful one, however, as with any project or assignment, there are areas for improvement. Firstly, the SUS and UEQ scales should have been used for the first prototype as well to allow for comparison between the two, furthermore, the test participant scope was very limited and should be widened to provide a real insight into this prototypes value.

Finally, hindsight has produced some missed features; the feature list gathered was organised in terms of relevance, scored by the user, therefore, instead of having a main menu organised by what the design team thought, it should have been organised by what the user felt was most relevant, which was obvious when looking at the feature list. This round of user testing also discovered that the majority of students are using OneDrive predominately for their university life, therefore, future versions should incorporate some OneDrive functionality or interoperability.

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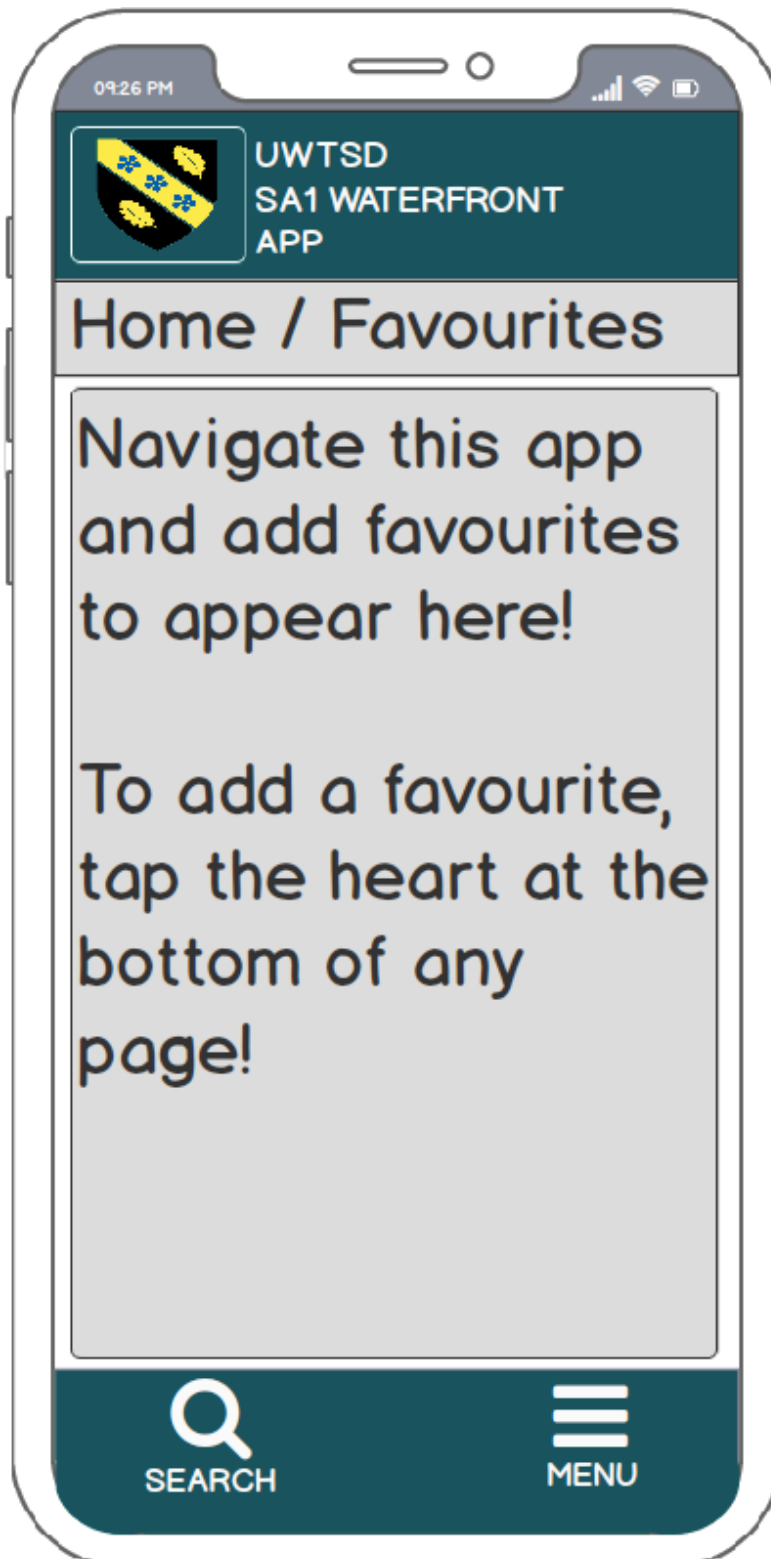
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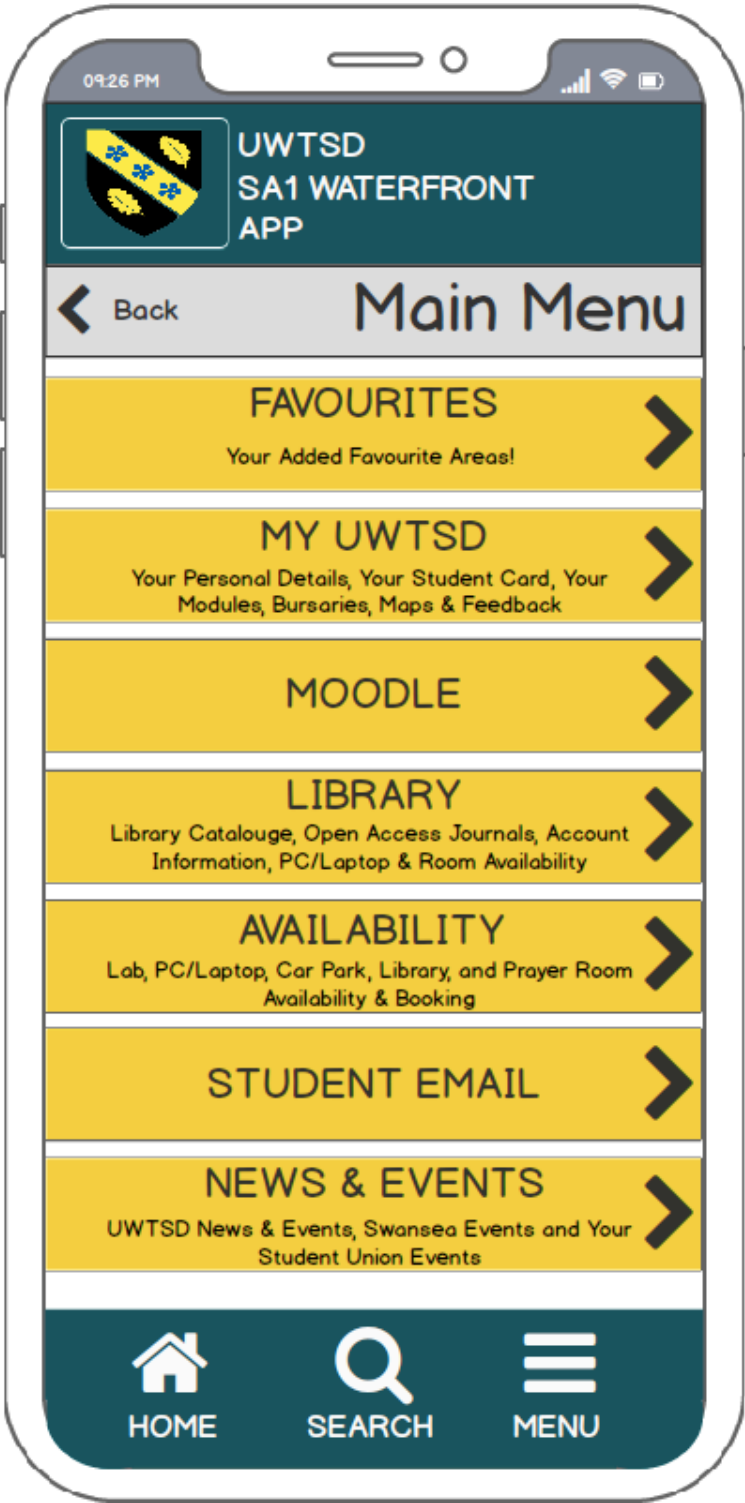
9. Appendix

Appendix A

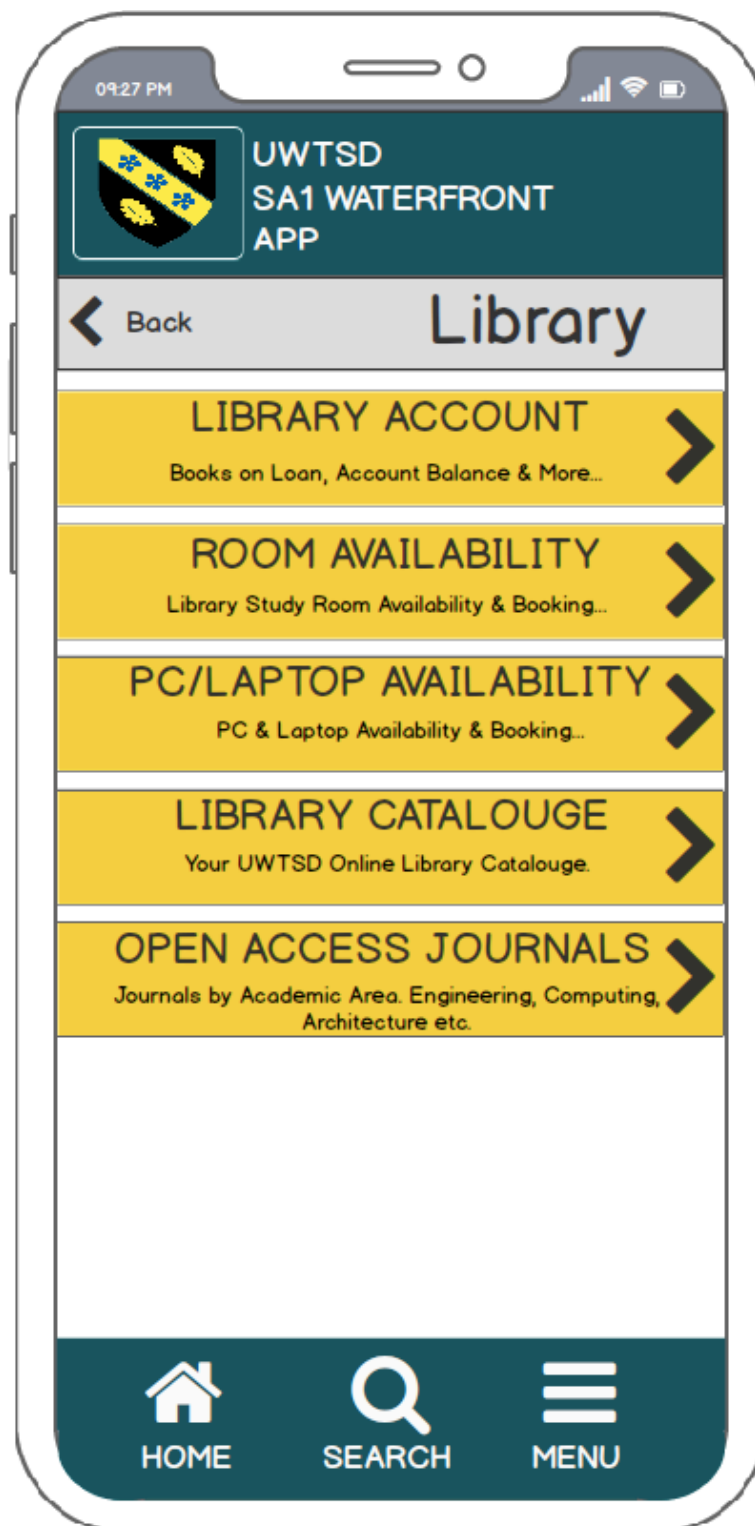
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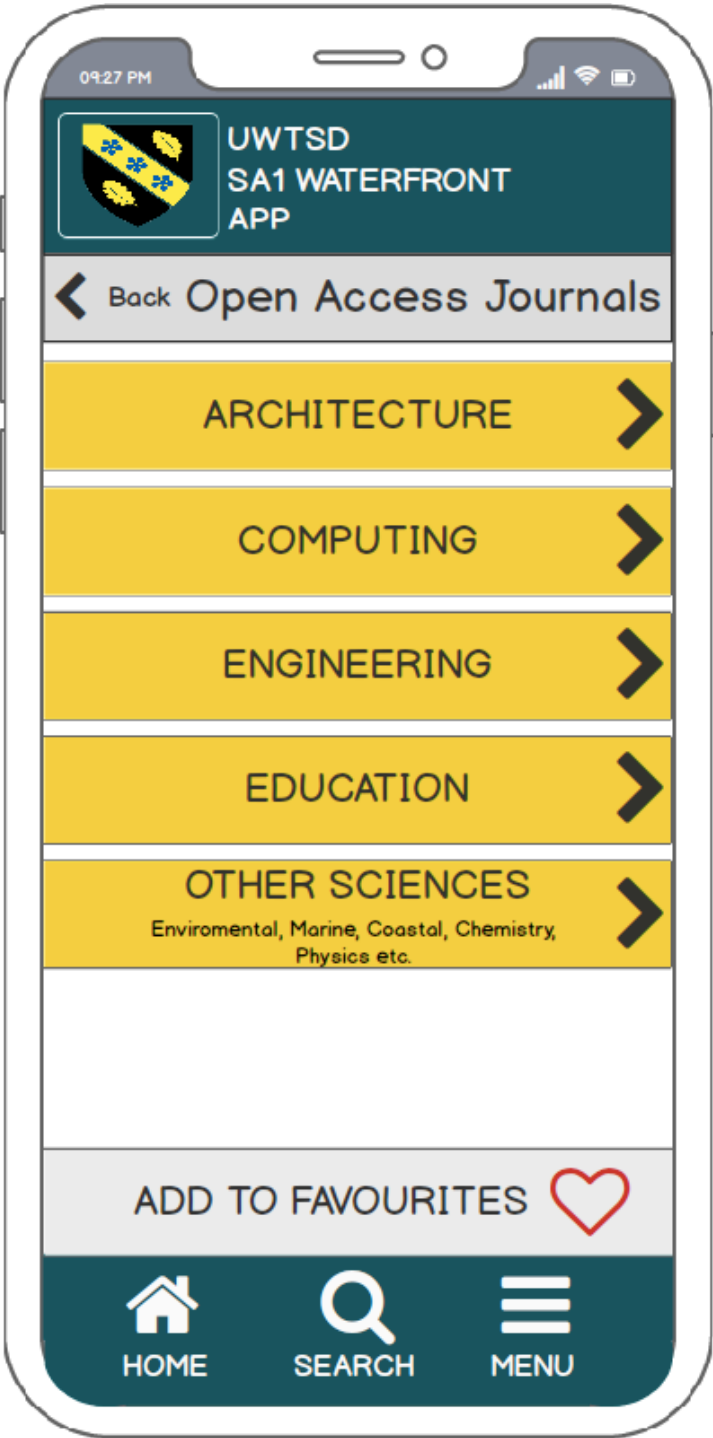


Main Menu



Library Menu

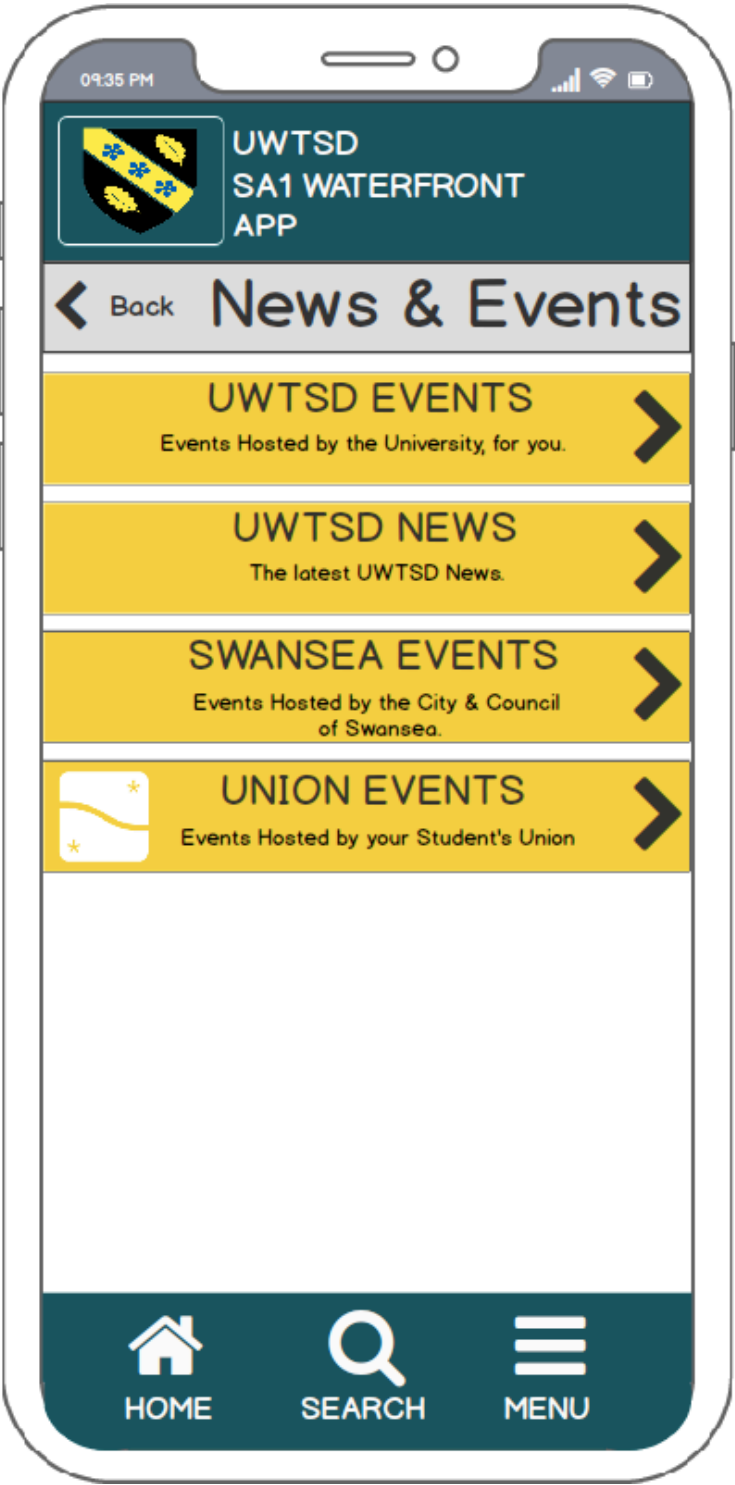




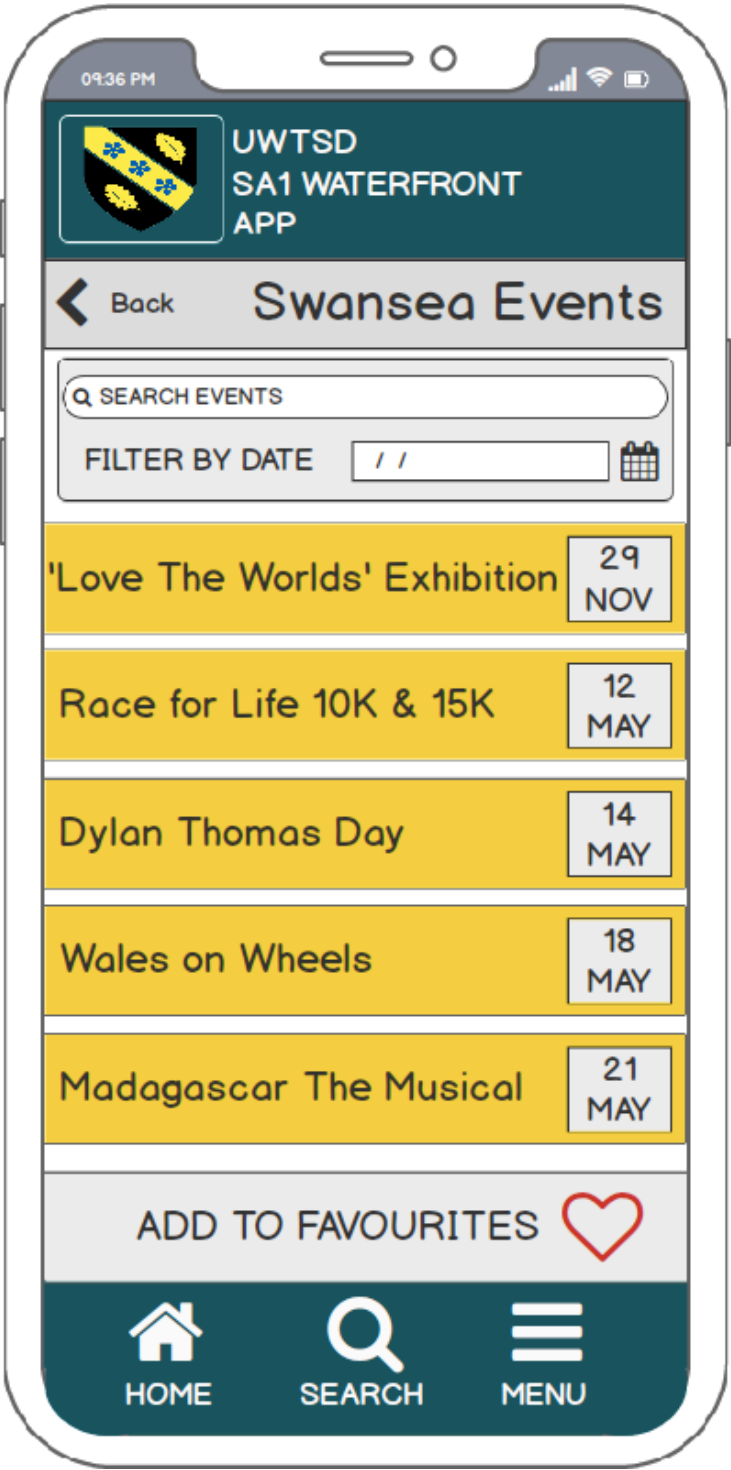
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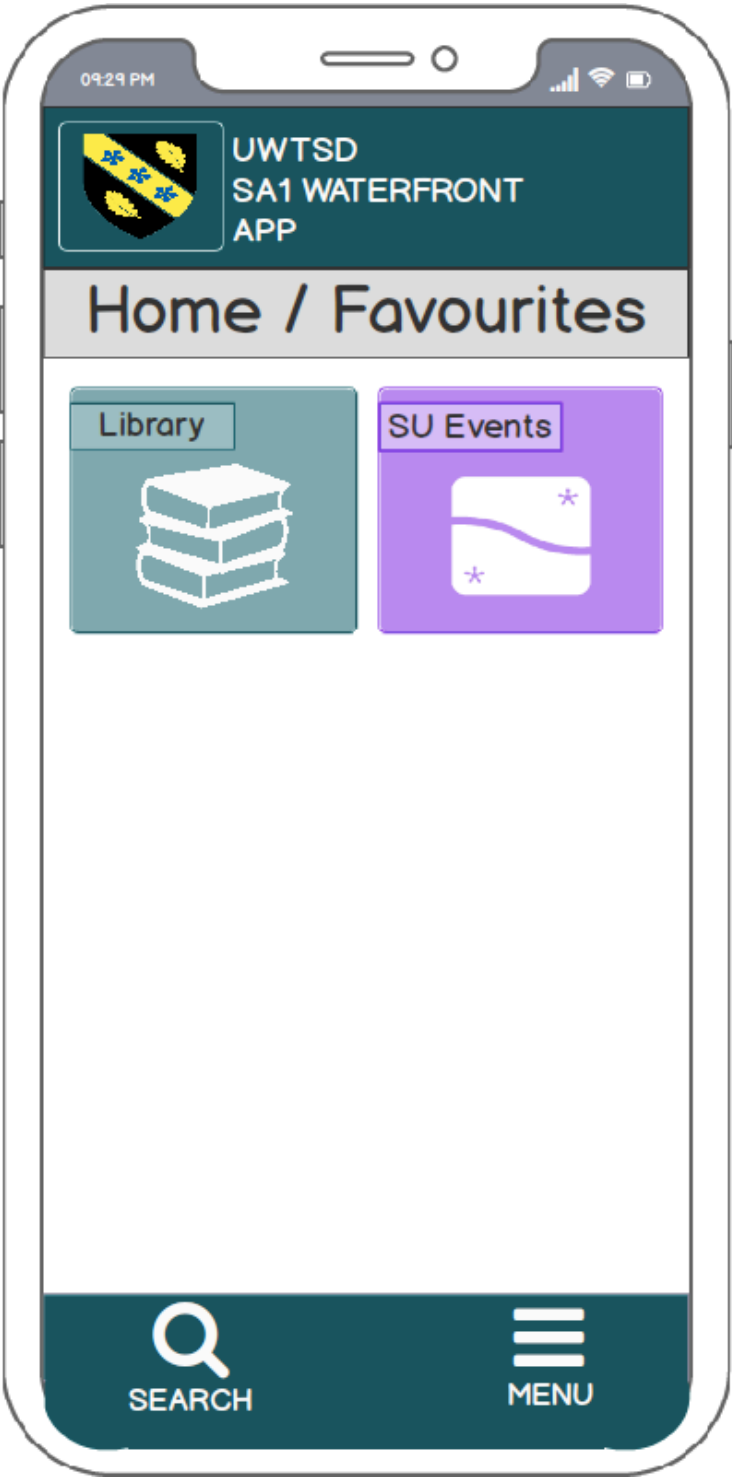
News & Events



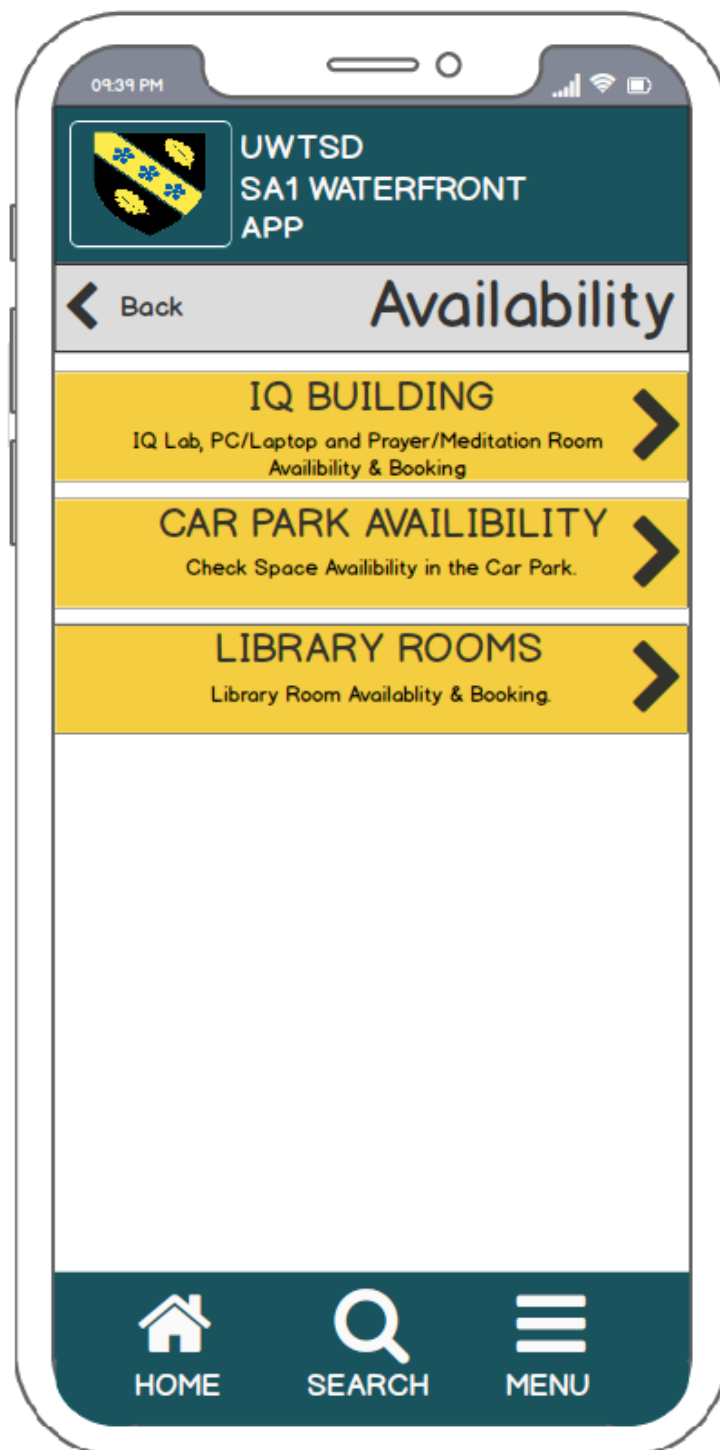
Swansea Events



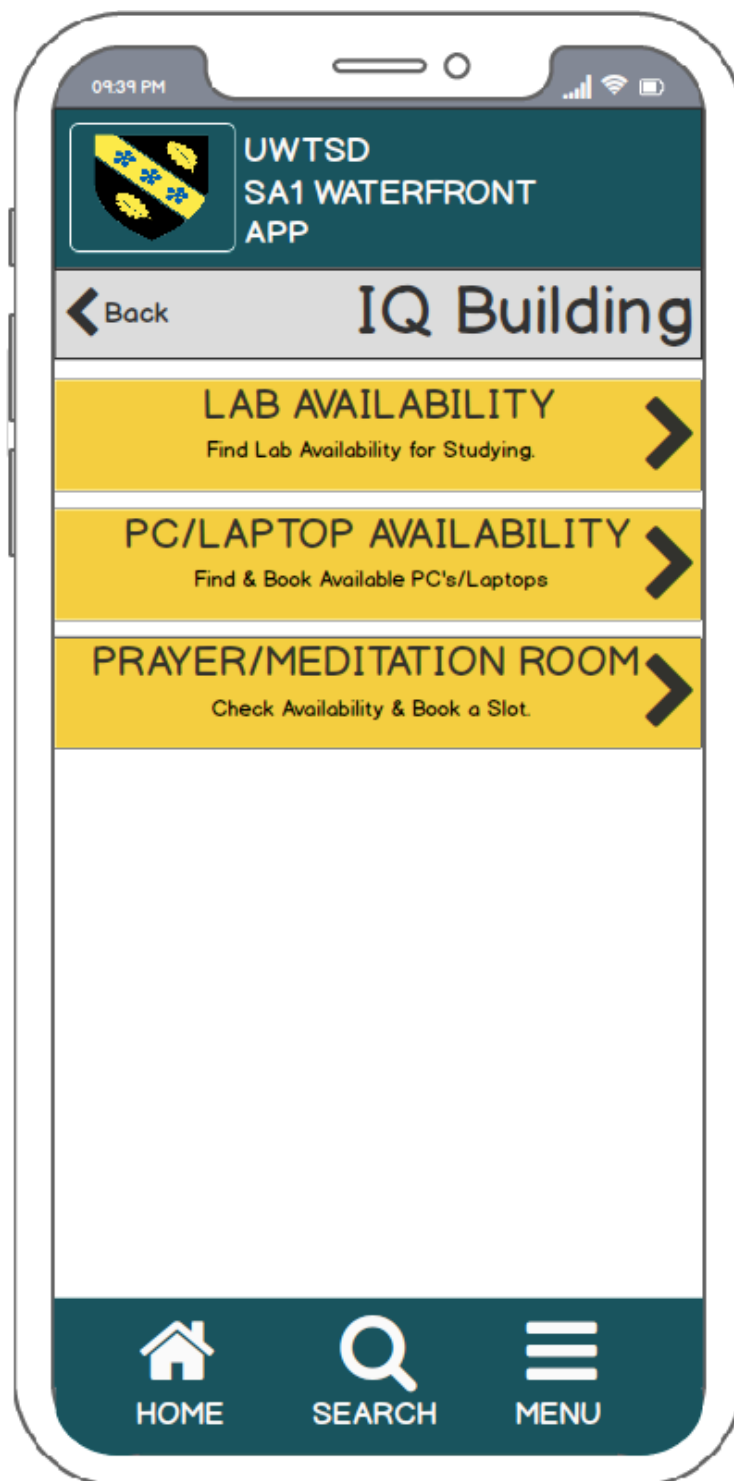
Home Favourites Two



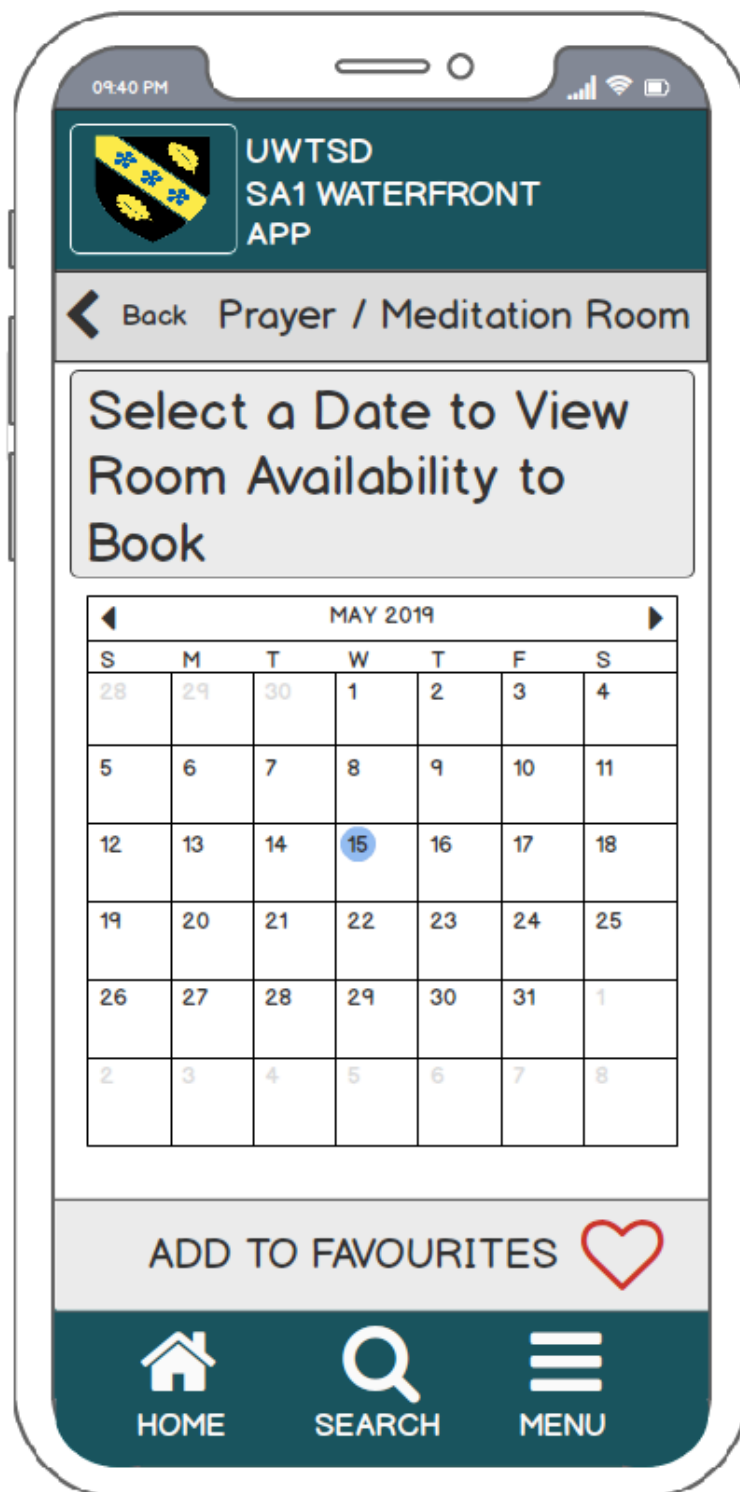
Availability



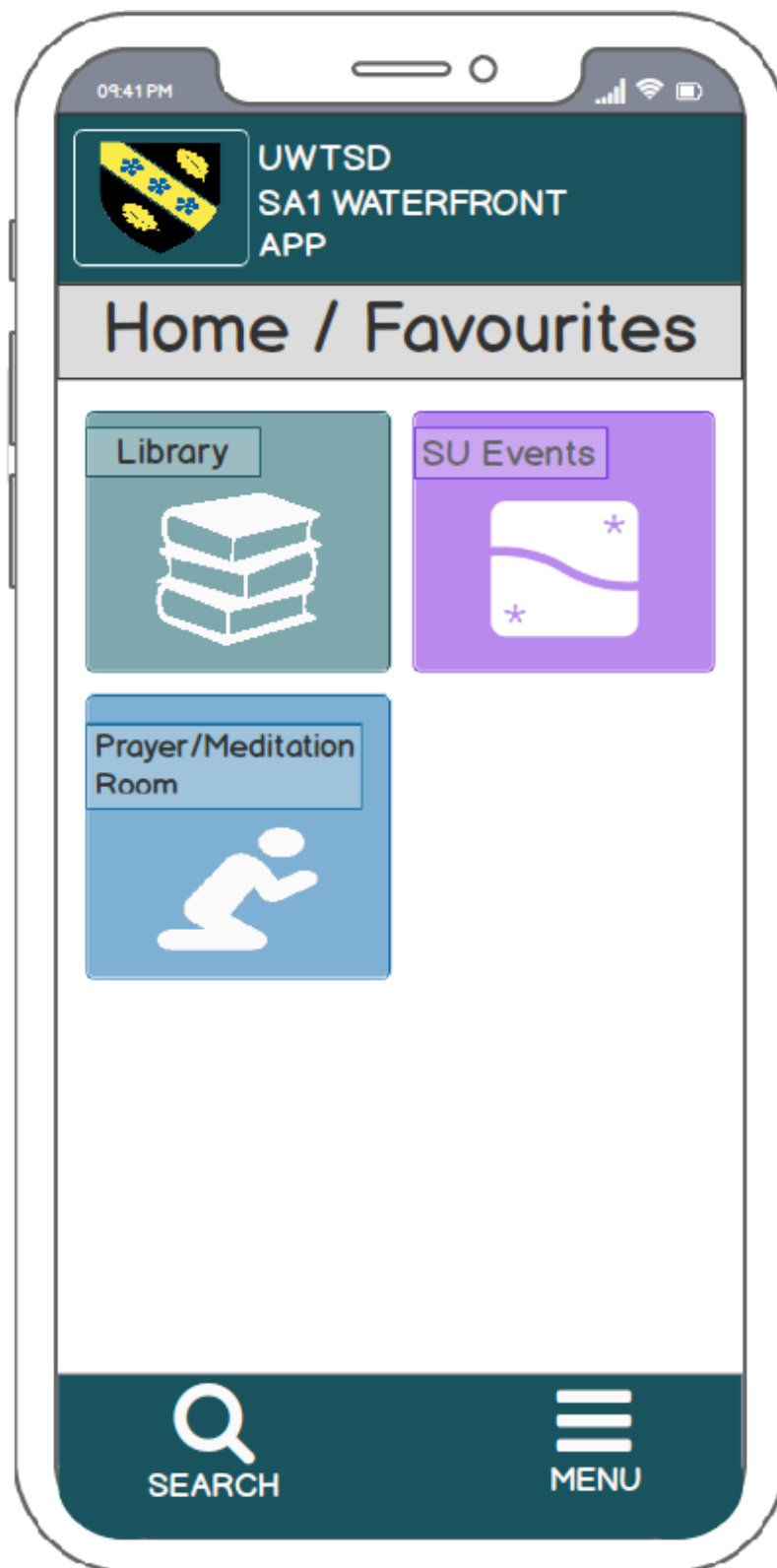
IQ Building



Prayer Room Booking



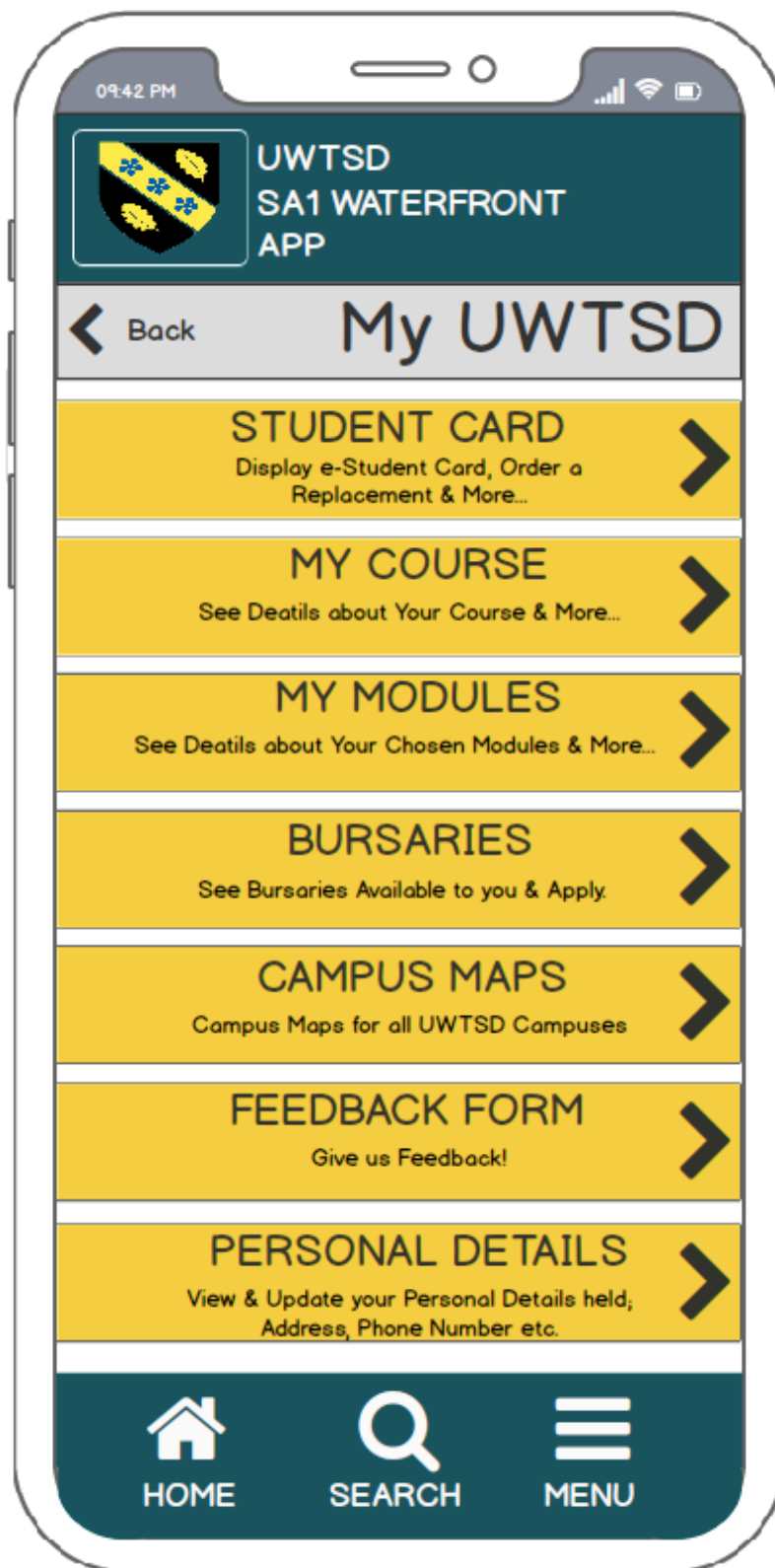
Favourites Three



Favourites Non-tiled



My UWTSD



Appendix B

1. The goal is to improve the usability of the product or system.

For the FACE app, the goal is to provide a proof-of-concept for the initial designs and discover if the proposed IA, labelling and copywriting works and to improve these if necessary.

2. The participants represent real users.

Real students will be employed for the usability tests, with consideration of the user personas.

3. The participants do real tasks.

The tests have been designed around the user scenarios meaning that the test is conducting actual tasks users may carry out.

4. You observe and record what the participants say.

Usually, a recording of the session would be made, however, for this assignment, notes will be taken on the user test script used.

5. Data is analysed, problems are diagnosed, and recommendations are made to fix them.

The collected answers and data will be evaluated, and any problems identified, and fixes suggested for use in the 3rd UxD assignment.

Appendix C

User Test Script

Paper Prototyping User Test

1. User Test Preamble

This section serves as an aide memoir to the team running tests and is essentially a checklist for the conduct of each test

Welcome

- Thanks for helping me out today.
- I have scheduled this session to run approximately 20 minutes.
- Before I start, I'll explain the setup and explain how the session works.

What we're doing today:

- I'm conducting some user research for my UxD module.
- I'm trying to identify issues that could be fixed to make the eventual app easier to use starting with testing on paper prototypes.
- And to do that I'm talking to people like you and based on your feedback I'm hoping to pinpoint areas for improvement.

Room setup

Let me explain the setup:

- I'll be asking you questions and talking you through the tests.
- I will be observing and taking notes.

There are a few things to keep in mind that will help the tests run smoother...

- First, this session is called a usability test. But it's important to know that I am not testing you I am testing the paper prototype of the application. There are no right or wrong answers, there are no trick questions, and I'm not trying to catch you out in any way. If you do come across problems, please understand that it's not your fault, it's the software's fault. And in fact, the more problems you find, the better I can fix them.
- Second, please be as candid as possible. If you don't like something, or think it's just plain silly, please say so. You won't hurt my feelings - I am here to improve this system so be as honest as possible!
- Thirdly, as you navigate around the paper prototype of the app, whatever is going through your head, please verbalise it. So, for example, if you're about to pretend click on a button, say "I'm going to click here because I think it's going to take me to the next page". Or "I'm looking around the pretend screen for the X". Basically, I want you to think out loud as it helps me write better notes. Also, if you could approach things slightly slower than you normally would, that would be helpful. If you work your way around the site too fast, I might not be able to take notes quick enough. I'll remind you to think out loud and to slow down throughout the session if needed.
- Finally, please feel free to ask any questions you like. It's a great way for me to understand your thoughts. But in order to keep the test as realistic as possible, I may not always answer your questions. Thanks for understanding. Do you have any questions now before we begin?

2. Pre-test Interview

Before we start using the paper prototype of the application/website, I'd just like to ask you some simple background questions, if that's okay?

Personal questions

Occupation:

Where do you live?

What age bracket are you in?

18-25 26 – 35 36 – 45 46 – 55 55+

What course are you studying?

Do you own a smartphone?

Do you use apps on your tablet or smartphone?

What sort of apps do you use?

System Usage

Please tell me about any apps you have used to help with university?

Is there an app you prefer? Why?

Describe the last time you used an app for university?

What was the scenario?

What was most important when you used an app?

e.g. Speed of finding information, features of the app?

3. User Testing Session

- **Paper prototype should be open to home page of the system.**

Do you have any questions so far?

- **Read each task aloud to participant**
- **Allow the user to proceed until you don't feel like it's producing any value, or the user becomes very frustrated.**
- **Repeat for each task or until time runs out.**

RESEARCH OBJECTIVES

- **Observe how user go through the locating of features process.**
- **Can user navigate the menus correctly?**
- **Is the wording clear?**
- **Is the design familiar at all?**

THE TASKS

1. *I am going to show you two versions of the entry page to the app, looking at the header of the entry page, could you tell me which one you prefer?*

If participant does not recognise the name change – point it out and let them express their opinion.

2. *Could you please, from this entry page, open the menu. Once open, could you tell me how do you feel about it?*

3. *Could you try and navigate to the section of the app which would allow you to update your personal details held by UWTSD?*

****END****

**SHOW HOME SCREEN AGAIN – ASK TO BRING UP MENU.
SHOW MENU.**

4. *Could you try and navigate to a section in this app where you could find architectural journals from the UWTSD online library?*

SHOW LIBRARY MENU AFTER CLICKING ON LIBRARY

SHOW JOURNALS PAGE

5. *Did you find that easy to find? Was it clear how you would achieve your goal?*

6. *What do you think of the naming of the journals section?*

7. *Could you now add this page to your favourites?*

8. *Could you now navigate back to the home page?*

SHOW HOME PAGE

****END****

9. *Can you now navigate to a section in the app which tells you about UWTSD student union events?*

SHOW MAIN MENU / SHOW NEWS & EVENTS MENU

SHOW UNION EVENTS PAGE

10. *Could you again add this page to your favourites and navigate back home, please?*

SHOW HOME PAGE WITH TWO TILES

11. *What do you think of the tiles used to store your fav links here?*

****END****

12. *Could you now find a section in this app which tells you of the IQ buildings prayer room availability?*

**SHOW MAIN MENU / SHOW AVAILIBILITY MENU / SHOW IQ MENU
SHOW PRAYER ROOM PAGE.**

13. *Did you find that easy to find? Was it clear how you would achieve your goal?*

14. *Could you again add this page to your favourites and navigate back home, please?*

15. *What do you think of the tiles used to store your favourite links here, now the layout has changed slightly?*

Thank you for completing those tests, your help will prove invaluable!

I am now going to ask you to fill out two short questionnaires, if that is ok?

GIVE QUESTIONNAIRES

SUS Questionnaire

Participant Name: _____

Date: ____/____/____

System Usability Scale

Instructions: For each of the following statements, mark one box that best describes your reactions to the paper prototype application *today*.

		Strongly Disagree				Strongly Agree
1.	I think that I would like to use this application frequently.	☐	☐	☐	☐	☐
2.	I found this application unnecessarily complex.	☐	☐	☐	☐	☐
3.	I thought this application was easy to use.	☐	☐	☐	☐	☐
4.	I think that I would need assistance to be able to use this application.	☐	☐	☐	☐	☐
5.	I found the various functions in this application were well integrated.	☐	☐	☐	☐	☐
6.	I thought there was too much inconsistency in this application.	☐	☐	☐	☐	☐
7.	I would imagine that most people would learn to use this application very quickly.	☐	☐	☐	☐	☐
8.	I found this application very cumbersome/awkward to use.	☐	☐	☐	☐	☐
9.	I felt very confident using this application.	☐	☐	☐	☐	☐
10.	I needed to learn a lot of things before I could get going with this application.	☐	☐	☐	☐	☐

Please provide any comments about this website:

This questionnaire is based on the System Usability Scale (SUS), which was developed by John Brooke while working at Digital Equipment Corporation. © Digital Equipment Corporation, 1986.

UEQ Questionnaire

Please make your evaluation now.

For the assessment of the product, please fill out the following questionnaire. The questionnaire consists of pairs of contrasting attributes that may apply to the product. The circles between the attributes represent gradations between the opposites. You can express your agreement with the attributes by ticking the circle that most closely reflects your impression.

Example:

attractive	☐	☒	☐	☐	☐	☐	☐	unattractive
------------	-----------------------	----------------------------------	-----------------------	-----------------------	-----------------------	-----------------------	-----------------------	--------------

This response would mean that you rate the application as more attractive than unattractive.

Please decide spontaneously. Don't think too long about your decision to make sure that you convey your original impression.

Sometimes you may not be completely sure about your agreement with a particular attribute or you may find that the attribute does not apply completely to the particular product. Nevertheless, please tick a circle in every line.

It is your personal opinion that counts. Please remember: there is no wrong or right answer!

Please assess the product now by ticking one circle per line.

	1	2	3	4	5	6	7		
annoying	☐	☐	☐	☐	☐	☐	☐	enjoyable	1
not understandable	☐	☐	☐	☐	☐	☐	☐	understandable	2
creative	☐	☐	☐	☐	☐	☐	☐	dull	3
easy to learn	☐	☐	☐	☐	☐	☐	☐	difficult to learn	4
valuable	☐	☐	☐	☐	☐	☐	☐	inferior	5
boring	☐	☐	☐	☐	☐	☐	☐	exciting	6
not interesting	☐	☐	☐	☐	☐	☐	☐	interesting	7
unpredictable	☐	☐	☐	☐	☐	☐	☐	predictable	8
fast	☐	☐	☐	☐	☐	☐	☐	slow	9
inventive	☐	☐	☐	☐	☐	☐	☐	conventional	10
obstructive	☐	☐	☐	☐	☐	☐	☐	supportive	11
good	☐	☐	☐	☐	☐	☐	☐	bad	12
complicated	☐	☐	☐	☐	☐	☐	☐	easy	13
unlikable	☐	☐	☐	☐	☐	☐	☐	pleasing	14
usual	☐	☐	☐	☐	☐	☐	☐	leading edge	15
unpleasant	☐	☐	☐	☐	☐	☐	☐	pleasant	16
secure	☐	☐	☐	☐	☐	☐	☐	not secure	17
motivating	☐	☐	☐	☐	☐	☐	☐	demotivating	18
meets expectations	☐	☐	☐	☐	☐	☐	☐	does not meet expectations	19
inefficient	☐	☐	☐	☐	☐	☐	☐	efficient	20
clear	☐	☐	☐	☐	☐	☐	☐	confusing	21
impractical	☐	☐	☐	☐	☐	☐	☐	practical	22
organized	☐	☐	☐	☐	☐	☐	☐	cluttered	23
attractive	☐	☐	☐	☐	☐	☐	☐	unattractive	24
friendly	☐	☐	☐	☐	☐	☐	☐	unfriendly	25
conservative	☐	☐	☐	☐	☐	☐	☐	innovative	26

Appendix D

D1. User Participant Scripts & Questionnaires

D1.1 Participant One Script

P1

Paper Prototyping User Test

Before we start using the paper prototype of the application/website, I'd just like to ask you some simple background questions, if that's okay?

Personal questions

Occupation: STUDENT

Where do you live?
ST. THOMAS.

What age bracket are you in?
☒ 18-25 26 - 35 36 - 45 46 - 55 55+

What course are you studying?
APPLIED COMPUTING.

Do you own a smartphone?
YES

Do you use apps on your tablet or smartphone?
YES

What sort of apps do you use?
MESSENGER.

Is there an app you prefer? Why?

GOOGLE MAPS.

Describe the last time you used an app for university?

ONE DRIVE

What was the scenario?

TO VIEW WORK.

What was most important when you used an app?

e.g. Speed of finding information, features of the app?

FEATURES OF ONE DRIVE.

3. User Testing Session

- Paper prototype should be open to home page of the system.

THE TASKS

1. I am going to show you two versions of the entry page to the app, looking at the header of the entry page, could you tell me which one you prefer?

UWTS D SAI - NOT AS CLUNKY, MORE SIMPLE.

PREFERRED SAI NAME AS IT LOOKS AND SOUNDS BETTER.

If participant does not recognise the name change – point it out and let them express their opinion.

2. Could you please, from this entry page, open the menu. Once open, could you tell me how do you feel about it?

COLOUR SCHEME RUBBISH, BUT GOT WHY IT WAS USED.
BIG CLUNKY, TOO MUCH GROUPED TOGETHER.
TOO SMALL FONT UNDERNEATH LABELS FOR DESC.

3. Could you try and navigate to the section of the app which would allow you to update your personal details held by UWTS D?

FOUND - NO PROBLEMS, INSTANTLY USED LABELLING TO FIND WAY.

****END****

**SHOW HOME SCREEN AGAIN – ASK TO BRING UP MENU.
SHOW MENU.**

4. Could you try and navigate to a section in this app where you could find architectural journals from the UWTSD online library?

FOUND LIBRARY NO PROBLEM, AGAIN USED LABELS.

SHOW LIBRARY MENU AFTER CLICKING ON LIBRARY

SHOW JOURNALS PAGE

5. Did you find that easy to find? Was it clear how you would achieve your goal?

YES, VERY CLEAR.

LAYOUT WAS GOOD - NOT AS BUSY AS MAIN MENU SO EASIER TO READ.

6. What do you think of the naming of the journals section?

AS LONG AS IT HAS JOURNALS IN THE NAME IT WILL BE OK

PRETTY IN-DIFFERENT ABOUT IT.

7. Could you now add this page to your favourites?

YES - NO PROBLEM.

8. Could you now navigate back to the home page?

FOUND - NO PROBLEM.

SHOW HOME PAGE

****END****

9. Can you now navigate to a section in the app which tells you about UWTSD student union events?

NO PROBLEMS FOUND - FOUND INSTANTLY.

~~NO EXTRA COMMENTS.~~

MAYBE ADD CONTACT INFO FOR UNION.

SHOW MAIN MENU / SHOW NEWS & EVENTS MENU

SHOW UNION EVENTS PAGE

10. Could you again add this page to your favourites and navigate back home, please?

NO PROBLEMS.

SHOW HOME PAGE WITH TWO TILES

11. What do you think of the tiles used to store your fav links here?

YES, NICE.

FAMILIAR TO MYISD + UNI PORTALS AND MOODLE.

****END****

12. Could you now find a section in this app which tells you of the IQ buildings prayer room availability?

FOUND NO PROBLEMS, USED LABELLING.

**SHOW MAIN MENU / SHOW AVAILABILITY MENU / SHOW IQ MENU
SHOW PRAYER ROOM PAGE.**

13. Did you find that easy to find? Was it clear how you would achieve your goal?

YES, VERY CLEAR. NAVIGATION IS CONSISTENT THROUGHOUT SO LEARNED PATTERN FROM BEFORE.

14. Could you again add this page to your favourites and navigate back home, please?

YES - N.P

15. What do you think of the tiles used to store your favourite links here, now the layout has changed slightly?

GOOD. VERY CLEAR, SIMPLE, EFFECTIVE.

Thank you for completing those tests, your help will prove invaluable!

I am now going to ask you to fill out two short questionnaires, if that is ok?

GIVE QUESTIONNAIRES

Participant Name: _____

Date: 16/05/19

System Usability Scale

Instructions: For each of the following statements, mark one box that best describes your reactions to the paper prototype application today.

	Strongly Disagree				Strongly Agree	
1. I think that I would like to use this application frequently.	☐	☐	☐	☒	☐	4
2. I found this application unnecessarily complex.	☒	☐	☐	☐	☐	4
3. I thought this application was easy to use.	☐	☐	☐	☐	☒	4
4. I think that I would need assistance to be able to use this application.	☒	☐	☐	☐	☐	4
5. I found the various functions in this application were well integrated.	☐	☐	☐	☒	☐	3
6. I thought there was too much inconsistency in this application.	☒	☐	☐	☐	☐	4
7. I would imagine that most people would learn to use this application very quickly.	☐	☐	☐	☐	☒	4
8. I found this application very cumbersome/awkward to use.	☒	☐	☐	☐	☐	4
9. I felt very confident using this application.	☐	☐	☐	☐	☒	4
10. I needed to learn a lot of things before I could get going with this application.	☒	☐	☐	☐	☐	4

39

Please provide any comments about this website:

Clunky in some areas, Overall good consistent design.
Easy to navigate and find what you're looking for.

Accommodates all levels of IT capacity, easy for everyone to use.

$$\begin{aligned} \text{TOTAL} &= 39 \times 2.5 \\ &= \underline{97.5} \end{aligned}$$

This questionnaire is based on the System Usability Scale (SUS), which was developed by John Brooke while working at Digital Equipment Corporation. © Digital Equipment Corporation, 1986.

Please assess the product now by ticking one circle per line.

	1	2	3	4	5	6	7			
annoying	☐	☐	☐	☐	☐	☒	☐	enjoyable	6	1
not understandable	☐	☐	☐	☐	☐	☐	☒	understandable	7	2
creative	☐	☒	☐	☐	☐	☐	☐	dull	2	3
easy to learn	☐	☒	☐	☐	☐	☐	☐	difficult to learn	2	4
valuable	☒	☐	☐	☐	☒	☐	☐	inferior	1	5
boring	☐	☐	☐	☒	☐	☐	☐	exciting	4	6
not interesting	☐	☐	☐	☐	☒	☐	☐	interesting	5	7
unpredictable	☐	☐	☐	☐	☐	☐	☒	predictable	7	8
fast	☐	☒	☐	☐	☐	☐	☐	slow	2	9
inventive	☐	☐	☒	☐	☐	☐	☐	conventional	3	10
obstructive	☐	☐	☐	☐	☐	☒	☐	supportive	6	11
good	☐	☒	☐	☐	☐	☐	☐	bad	2	12
complicated	☐	☐	☐	☐	☐	☐	☒	easy	7	13
unlikable	☐	☐	☐	☐	☒	☐	☐	pleasing	5	14
usual	☐	☐	☐	☒	☐	☐	☐	leading edge	4	15
unpleasant	☐	☐	☐	☐	☒	☐	☐	pleasant	5	16
secure	☐	☐	☒	☐	☐	☐	☐	not secure	3	17
motivating	☐	☐	☐	☒	☐	☐	☐	demotivating	4	18
meets expectations	☐	☒	☐	☐	☐	☐	☐	does not meet expectations	2	19
inefficient	☐	☐	☐	☐	☐	☒	☐	efficient	6	20
clear	☒	☐	☐	☐	☐	☐	☐	confusing	1	21
impractical	☐	☐	☐	☐	☐	☒	☐	practical	6	22
organized	☐	☐	☐	☐	☒	☐	☐	cluttered	5	23
attractive	☐	☐	☐	☐	☒	☐	☐	unattractive	5	24
friendly	☐	☐	☒	☐	☐	☐	☐	unfriendly	3	25
conservative	☐	☐	☐	☒	☐	☐	☐	innovative	4	26

D1.2 Participant Two Script

Paper Prototyping User Test

P2

2. Pre-test Interview

Before we start using the paper prototype of the application/website, I'd just like to ask you some simple background questions, if that's okay?

Personal questions

Occupation: STUDENT / WAITER

Where do you live?

PLYMOUTH / SWANSEA

What age bracket are you in?

☒ 18-25 ☐ 26-35 ☐ 36-45 ☐ 46-55 ☐ 55+

What course are you studying?

AUTOMOTIVE DESIGN

Do you own a smartphone?

YES

Do you use apps on your tablet or smartphone?

YES, SOCIAL MEDIA, E-MAIL, CAD APP MODELLING

What sort of apps do you use?



System Usage

Please tell me about any apps you have used to help with university?

E-MAIL, ONEDRIVE, MOODLE

Is there an app you prefer? Why?

MOODLE AS YOU CAN SEE MODULE INFO.

Describe the last time you used an app for university?

MOODLE TO CHECK EXAM TIMETABLE.

What was the scenario?

N/A

What was most important when you used an app?

e.g. Speed of finding information, features of the app?

FEATURES + ACCURATE INFO.

THE TASKS

1. I am going to show you two versions of the entry page to the app, looking at the header of the entry page, could you tell me which one you prefer?

FACE APP - THOUGHT HEADER LOOKED NEATER.

SAT WATERFRONT TOO MUCH OF A MOUTHFUL.

SUGGESTED 'SAT FACE' APP.

If participant does not recognise the name change – point it out and let them express their opinion.

2. Could you please, from this entry page, open the menu. Once open, could you tell me how do you feel about it?

- BUTTONS ARE NARROW + TEXT SMALL

- SPACING WEIRD - WHY HAVE WHITE GAP?

- THEY LOOK LIKE BUTTONS.

3. Could you try and navigate to the section of the app which would allow you to update your personal details held by UWTSD?

FOUND NO PROBLEM - USED LABELLING.

****END****

**SHOW HOME SCREEN AGAIN – ASK TO BRING UP MENU.
SHOW MENU.**

4. Could you try and navigate to a section in this app where you could find architectural journals from the UWTSD online library?

- FOUND LIBRARY + JOURNALS NO PROB
- ALTHOUGH WAS CONFUSED AS COULD GET
ARCHITECTURAL JOURNALS IN THE STANDARD
LIBRARY.

SHOW LIBRARY MENU AFTER CLICKING ON LIBRARY

SHOW JOURNALS PAGE

5. Did you find that easy to find? Was it clear how you would achieve your goal?

YES - UP UNTIL INTERNAL OR EXTERNAL
JOURNALS.

6. What do you think of the naming of the journals section?

AS ABOVE,

7. Could you now add this page to your favourites?

NO PROBLEMS

8. Could you now navigate back to the home page?

NO PROBS.

SHOW HOME PAGE

****END****

9. Can you now navigate to a section in the app which tells you about UWTSD student union events?

NO PROBLEMS FOUND. SELF EXPLANATORY LABELS + BTTONNS.

SHOW MAIN MENU / SHOW NEWS & EVENTS MENU
SHOW UNION EVENTS PAGE

10. Could you again add this page to your favourites and navigate back home, please?

NO PROBLEM.

SHOW HOME PAGE WITH TWO TILES

11. What do you think of the tiles used to store your fav links here?

- CLEAR, OBVIOUS, BIG ICONS.

****END****

12. Could you now find a section in this app which tells you of the IQ buildings prayer room availability?

NO PROBLEMS.

**SHOW MAIN MENU / SHOW AVAILABILITY MENU / SHOW IQ MENU
SHOW PRAYER ROOM PAGE.**

13. Did you find that easy to find? Was it clear how you would achieve your goal?

YES, VERY CLEAR FOLLOWED LABELLING.

14. Could you again add this page to your favourites and navigate back home, please?

N.P.

15. *What do you think of the tiles used to store your favourite links here, now the layout has changed slightly?*

AS BEFORE, VERY CLEAR + WHAT YOU WANT.

Thank you for completing those tests, your help will prove invaluable!

I am now going to ask you to fill out two short questionnaires, if that is ok?

GIVE QUESTIONNAIRES

Participant Name: _____

Date: 16/5/19.

System Usability Scale

Instructions: For each of the following statements, mark one box that best describes your reactions to the paper prototype application today.

	Strongly Disagree				Strongly Agree	
1. I think that I would like to use this application frequently.	☐	☐	☐	☐	☒	4
2. I found this application unnecessarily complex.	☒	☐	☐	☐	☐	4
3. I thought this application was easy to use.	☐	☐	☐	☒	☐	3
4. I think that I would need assistance to be able to use this application.	☒	☐	☐	☐	☐	4
5. I found the various functions in this application were well integrated.	☐	☐	☐	☐	☒	4
6. I thought there was too much inconsistency in this application.	☒	☐	☐	☐	☐	4
7. I would imagine that most people would learn to use this application very quickly.	☐	☐	☐	☐	☒	4
8. I found this application very cumbersome/awkward to use.	☐	☒	☐	☐	☐	3
9. I felt very confident using this application.	☐	☐	☐	☒	☐	3
10. I needed to learn a lot of things before I could get going with this application.	☒	☐	☐	☐	☐	4

Please provide any comments about this website:

- / MIGHT CONSIDER DIFFERENT COLOUR SCHEME?
- / PARTICULARLY LIKE 'FAVOURITE' TILE VIEW.
- / AS MENTIONED BUTTON SUB-TEXT IS QUITE SMALL.
- / GOOD OVERALL.

37

$$\begin{aligned} \text{TOTAL} &= 37 \times 2.5 \\ &= \underline{92.5} \end{aligned}$$

This questionnaire is based on the System Usability Scale (SUS), which was developed by John Brooke while working at Digital Equipment Corporation. © Digital Equipment Corporation, 1986.

Please assess the product now by ticking one circle per line.

	1	2	3	4	5	6	7			
annoying	☐	☐	☐	☐	☐	☒	☐	enjoyable	6	1
not understandable	☐	☐	☐	☐	☐	☒	☐	understandable	6	2
creative	☐	☐	☒	☐	☐	☐	☐	dull	3	3
easy to learn	☒	☐	☐	☐	☐	☐	☐	difficult to learn	1	4
valuable	☐	☒	☐	☐	☐	☐	☐	inferior	2	5
boring	☐	☐	☐	☒	☐	☐	☐	exciting	4	6
not interesting	☐	☐	☐	☐	☒	☐	☐	interesting	5	7
unpredictable	☐	☐	☐	☐	☐	☒	☐	predictable	6	8
fast	☐	☒	☐	☐	☐	☐	☐	slow	2	9
inventive	☐	☐	☒	☐	☐	☐	☐	conventional	3	10
obstructive	☐	☐	☐	☐	☐	☒	☐	supportive	5	11
good	☒	☐	☐	☐	☐	☐	☐	bad	1	12
complicated	☐	☐	☐	☐	☐	☐	☒	easy	7	13
unlikable	☐	☐	☐	☐	☐	☒	☐	pleasing	6	14
usual	☐	☐	☐	☒	☐	☐	☐	leading edge	4	15
unpleasant	☐	☐	☐	☐	☐	☒	☐	pleasant	6	16
secure	☐	☒	☐	☐	☐	☐	☐	not secure	2	17
motivating	☐	☒	☐	☐	☐	☐	☐	demotivating	2	18
meets expectations	☒	☐	☐	☐	☐	☐	☐	does not meet expectations	1	19
inefficient	☐	☐	☐	☐	☐	☐	☒	efficient	7	20
clear	☐	☒	☐	☐	☐	☐	☐	confusing	2	21
impractical	☐	☐	☐	☐	☐	☒	☐	practical	6	22
organized	☐	☒	☐	☐	☐	☐	☐	cluttered	2	23
attractive	☐	☒	☐	☐	☐	☐	☐	unattractive	2	24
friendly	☐	☐	☒	☐	☐	☐	☐	unfriendly	3	25
conservative	☐	☐	☐	☐	☒	☐	☐	innovative	5	26

D1.3 Participant Three Script

Paper Prototyping User Test

P3.

2. Pre-test Interview

Before we start using the paper prototype of the application/website, I'd just like to ask you some simple background questions, if that's okay?

Personal questions

Occupation: STUDENT / SOUS CHEF

Where do you live?

SWANSEA

What age bracket are you in?

18-25 26-35 36-45 46-55 55+

What course are you studying?

BUSINESS MANAGEMENT

Do you own a smartphone?

YES

Do you use apps on your tablet or smartphone?

YES SOCIAL MEDIA, HEALTHY APPS, YOUTUBE.

What sort of apps do you use?

BANKING.

System Usage

Please tell me about any apps you have used to help with university?

COMPASS, LINKED IN, MY DAY.

Is there an app you prefer? Why?

~~best~~ MYDAY FOR ALL UNI RELATED THINGS
TIMETABLE, ONE DRIVE, MOODLE ETC.

Describe the last time you used an app for university?

E-MAILS THROUGH MYDAY.
+ MOODLE CHECK ASSIGNMENT HAND-IN

What was the scenario? DATE.

What was most important when you used an app?

e.g. Speed of finding information, features of the app?

SPEED OF ACCESSIBILITY - ~~very~~ INTERMS
OF NAVIGATION.

THE TASKS

1. I am going to show you two versions of the entry page to the app, looking at the header of the entry page, could you tell me which one you prefer?

- PREFERRED LARGE UNI LOGO AS IT REPRESENTED UNI BETTER
- BUT PREFERRED WATERFRONT NAME AS IT ASSOCIATED BETTER WITH THE CAMPS.

If participant does not recognise the name change – point it out and let them express their opinion.

2. Could you please, from this entry page, open the menu. Once open, could you tell me how do you feel about it?

- GOOD, EVERYTHING YOU NEED.

3. Could you try and navigate to the section of the app which would allow you to update your personal details held by UWTSD?

NO PROBLEMS, FOUND INSTANTLY BY READING LABELLING.

****END****

**SHOW HOME SCREEN AGAIN – ASK TO BRING UP MENU.
SHOW MENU.**

4. Could you try and navigate to a section in this app where you could find architectural journals from the UWTSD online library?

FOUND NO PROBLEMS. ~~OS~~

SHOW LIBRARY MENU AFTER CLICKING ON LIBRARY

SHOW JOURNALS PAGE

5. Did you find that easy to find? Was it clear how you would achieve your goal?

YES, OBVIOUS BECAUSE OF CLEAR LABELLING.

COMMENTED ITS BETTER THAN ACTUAL UWI APPS.

6. What do you think of the naming of the journals section?

NO, ONLY THING IT COULD BE IS 'JOURNALS'.

7. Could you now add this page to your favourites?

YES - N.P.

8. Could you now navigate back to the home page?

YES - USED HOME BUTTON

SHOW HOME PAGE

****END****

9. Can you now navigate to a section in the app which tells you about UWTSD student union events?

FOUND INSTANTLY.

SHOW MAIN MENU / SHOW NEWS & EVENTS MENU

SHOW UNION EVENTS PAGE

10. Could you again add this page to your favourites and navigate back home, please?

YES - N.P.

SHOW HOME PAGE WITH TWO TILES

11. What do you think of the tiles used to store your fav links here?

CLEAR, CONCISE + ICONS OBVIOUS.
COLOURS OF TILES GOOD.

****END****

12. Could you now find a section in this app which tells you of the IQ buildings prayer room availability?

FOUND INSTANTLY.

SHOW MAIN MENU / SHOW AVAILABILITY MENU / SHOW IQ MENU
SHOW PRAYER ROOM PAGE.

13. Did you find that easy to find? Was it clear how you would achieve your goal?

YES, CLEAR LABELLING AND
LABELLING DENOTES WHAT IT SHOULD
BE.

14. Could you again add this page to your favourites and navigate back home, please?

YES - N.P.

15. *What do you think of the tiles used to store your favourite links here, now the layout has changed slightly?*

• CLEAR + CONCISE AGAIN.

Thank you for completing those tests, your help will prove invaluable!

I am now going to ask you to fill out two short questionnaires, if that is ok?

GIVE QUESTIONNAIRES

Participant Name: _____

Date: 16/5/19

System Usability Scale

Instructions: For each of the following statements, mark one box that best describes your reactions to the paper prototype application today.

		Strongly Disagree				Strongly Agree	
1.	I think that I would like to use this application frequently.	☐	☒	☐	☐	☐	4
2.	I found this application unnecessarily complex.	☒	☐	☐	☐	☐	4
3.	I thought this application was easy to use.	☐	☒	☐	☐	☐	4
4.	I think that I would need assistance to be able to use this application.	☒	☐	☐	☐	☐	4
5.	I found the various functions in this application were well integrated.	☐	☒	☐	☐	☐	4
6.	I thought there was too much inconsistency in this application.	☒	☐	☐	☐	☐	4
7.	I would imagine that most people would learn to use this application very quickly.	☐	☒	☐	☐	☐	4
8.	I found this application very cumbersome/awkward to use.	☒	☐	☐	☐	☐	4
9.	I felt very confident using this application.	☐	☒	☐	☐	☐	4
10.	I needed to learn a lot of things before I could get going with this application.	☒	☐	☐	☐	☐	4

40

Please provide any comments about this website:

- Easy Visually easy to use
- colour coding fav. useful
- Clearly labelled
- Logical location of ~~programmes~~ functions
- Concise

TOTAL
= 40 x 2.5
= 100

Please assess the product now by ticking one circle per line.

	1	2	3	4	5	6	7			
annoying	☒	☐	☐	☐	☐	☐	☐	enjoyable	5	1
not understandable	☐	☐	☐	☐	☐	☐	☐	understandable	7	2
creative	☐	☐	☐	☐	☐	☐	☐	dull	5	3
easy to learn	☐	☒	☐	☐	☐	☐	☐	difficult to learn	2	4
valuable	☐	☐	☒	☐	☐	☐	☐	inferior	3	5
boring	☐	☐	☐	☐	☒	☐	☐	exciting	5	6
not interesting	☐	☐	☐	☐	☒	☐	☐	interesting	5	7
unpredictable	☐	☐	☐	☐	☐	☐	☒	predictable	7	8
fast	☒	☐	☐	☐	☐	☐	☐	slow	1	9
inventive	☐	☐	☐	☒	☐	☐	☐	conventional	4	10
obstructive	☐	☐	☐	☐	☐	☐	☒	supportive	6	11
good	☐	☒	☐	☐	☐	☐	☐	bad	2	12
complicated	☐	☐	☐	☐	☐	☐	☒	easy	7	13
unlikable	☐	☐	☐	☐	☒	☐	☐	pleasing	5	14
usual	☐	☐	☐	☒	☐	☐	☐	leading edge	4	15
unpleasant	☐	☐	☐	☐	☒	☐	☐	pleasant	5	16
secure	☐	☒	☐	☐	☐	☐	☐	not secure	2	17
motivating	☐	☐	☒	☐	☐	☐	☐	demotivating	3	18
meets expectations	☒	☐	☐	☐	☐	☐	☐	does not meet expectations	1	19
inefficient	☐	☒	☐	☐	☐	☐	☒	efficient	7	20
clear	☒	☐	☐	☐	☐	☐	☐	confusing	1	21
impractical	☐	☐	☐	☐	☐	☐	☒	practical	7	22
organized	☒	☐	☐	☐	☐	☐	☐	cluttered	1	23
attractive	☐	☒	☐	☐	☐	☒	☐	unattractive	2	24
friendly	☐	☐	☒	☐	☐	☐	☐	unfriendly	3	25
conservative	☐	☐	☐	☐	☒	☐	☐	innovative	5	26

D2. User Participant One Results

D2.1 Participant One Results

<i>Users</i>	<i>Details</i>
Name	User Participant One
Demographic	Student, 18-25.
Description from Personal Questions	Participant one is a full-time applied computing student, from Swansea in the 18-25 age bracket. As a computing student he can be considered competent with this technology.
System Usage Questions	Participant one is a heavy smart phone user, who mainly uses OneDrive for university life as the features of the app allow him to view his university work on the move. Other apps quoted were Google maps, possibly pointing towards a like for productivity apps.
Question Answers	1. Preferred the new 'SA1' waterfront name and looks of the branding as it was simpler and 'less clunky'. 2. Did not like the colour scheme, although he commented that he saw it matched the university's branding. Did not like the main menu, commenting it was 'busy' and 'clunky'. Also commented font was also too small to read clearly. 3. In contradiction, the user found no problems finding the personal details section and commented that he used the labelling. 4. No problems in finding the Library journals section. Used labelling. 5. Goal was clear and easily achievable. Commented that there was less labelling so was easier to read. 6. Thought journal naming was good but also commented that anything with the word 'journal' in it would be suitable. 7. No problems with adding to favourites. 8. No problems found. Home button very clear. 9. Found union events with no problem. Commented that user contact information for the union should be included. Again, used the labelling to find his way. 10. No problems adding to fav's and navigating home. 11. Liked the tiling, felt it looked like 'MyDay' and 'Moodle'.

- 12. No problems found in navigating to the prayer room availability section.
- 13. Knew exactly what goal was and how to achieve it.
Commented that navigation has been consistent throughout so was easy to find.
- 14. No problems found.
- 15. Very clear and effective.

D2.2 Participant Two Results

<i>Users</i>	<i>Details</i>
Name	User Participant Two
Demographic	Student, 18-25.
Description from Personal Questions	Participant Two is a full-time automotive design student from Plymouth who lives in Swansea. A heavy user of apps for university and computer programs related to the course, they are a competent smartphone/computer user.
System Usage Questions	Participant two uses apps such for email, Moodle and OneDrive. P2 likes Moodle for its features, especially as it contains exam timetable information. Accurate information and app features were most important to P2 in a university app.
Question Answers	1. Preferred the FACE app branding as they thought the header looked neater. Commented that 'SA1 Waterfront' was a bit of a mouthful and suggested 'SA1 FACE'. 2. Thought buttons were too narrow and text labelling was too small. Didn't think the buttons needed a large white gap between them, however, commented they did look like buttons. 3. No problem in finding personal details – used labelling as expected. 4. Found library journals no problem, used labelling to guide. When confronted with choices in library menu P2 did get confused – commented that the library also has journals on architecture, it is not just external providers. 5. Yes, understood goal until confusion with internal and external journals. 6. As above – confused with naming. 7. No problems adding to favourites. 8. No problems navigating home. 9. Found union events no problems. Self-explanatory labels and buttons. 10. No problems. 11. Tiles for home page/favs were clear, obvious. Liked the big icons. 12. No problems finding the prayer room. No further comments. 13. Clear and concise goal – followed labelling and expected behaviour from app ensued.

14. No problems.

15. As 11, very clear and exactly what you would want.

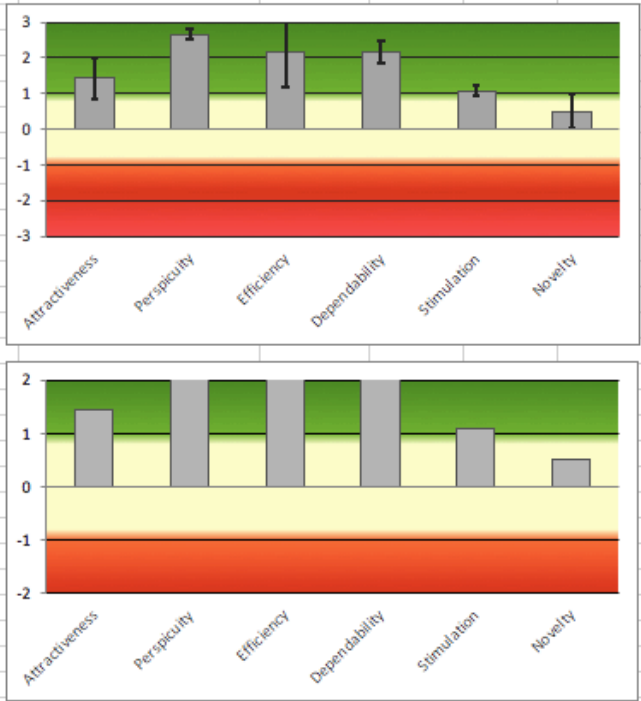
D2.3 Participant Three Results

<i>Users</i>	<i>Details</i>
Name	User Participant Three
Demographic	Student, 18-25.
Description from Personal Questions	Participant three is in the 18-25 age bracket, from Swansea, studying Business Management. Although high app use, their course does not utilise complex computer programs so it could be concluded their computer literacy is intermediate.
System Usage Questions	Participant three uses MyDay, Moodle and LinkedIn for university but prefers MyDay as it enables quick access to Moodle, OneDrive and timetabling information. The most important thing to P2 is quick accessibility to items in terms of navigation.
Question Answers	1. Preferred large university logo on old design as it represented the university better. However, they preferred the 'SA1 Waterfront' name as they felt it associated better with the campus. 2. Menu was clear with everything expected there. 3. No problems finding the personal details section, found labelling helpful, clear and concise. 4. No problems in finding the library section. 5. Goal was clear and obvious because of the labelling. Even commented that it was better than existing university app's design! 6. Thought the naming of journal section was good, added that that was probably the only name it could be given. 7. Yes, no problems adding favourite. 8. No problems – used home button. 9. Found union events instantly, again used the labelling as guidance. 10. No problems found. 11. Favourites page clear and concise, icons used denote content well. Colours of the tiles are good. 12. Found the prayer room availability instantly. 13. Goal was clear, again through good labelling and sub-labelling. 14. No problems. 15. Favourites clear and concise.

D3. User Experience Spreadsheet Results

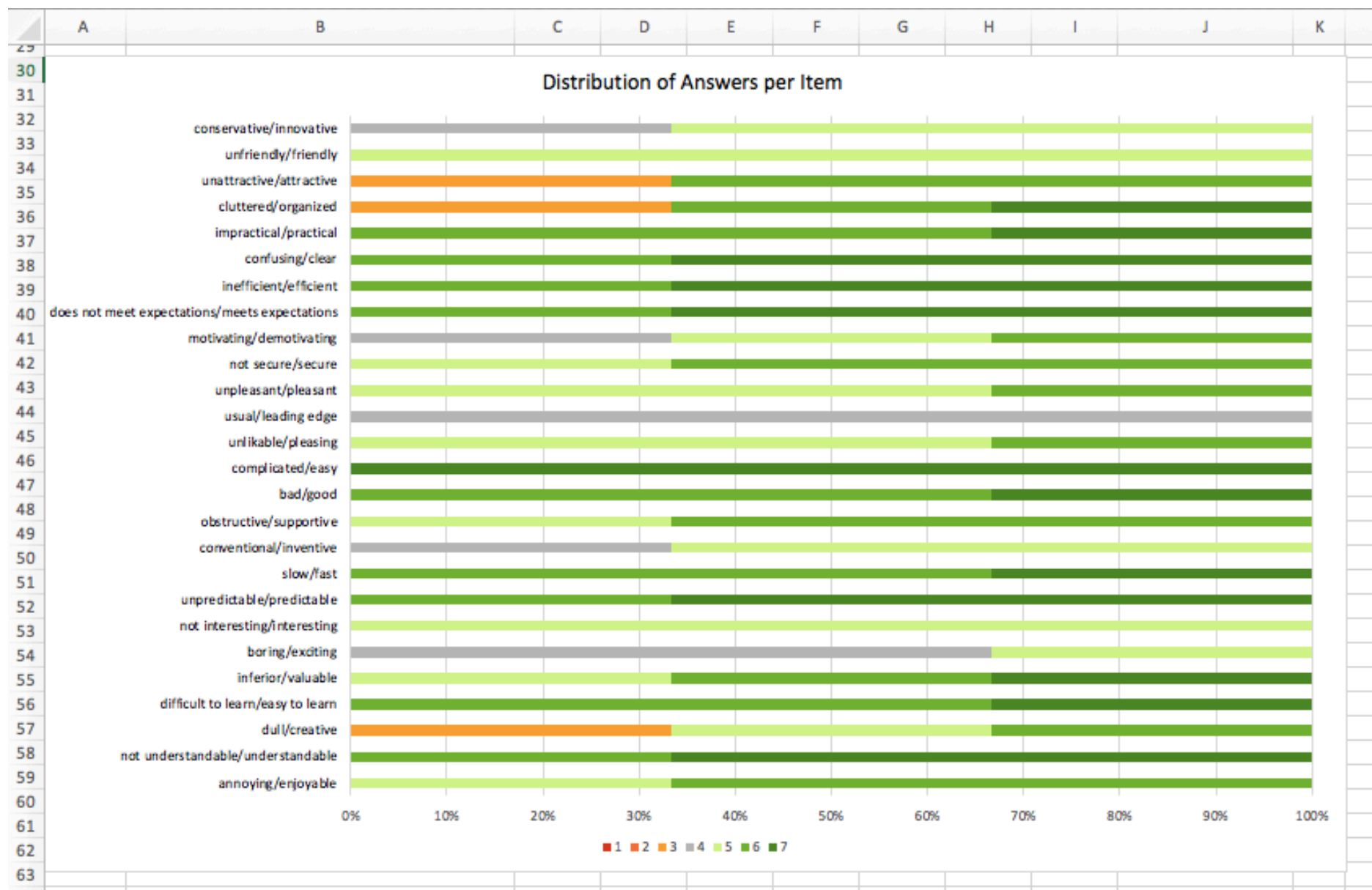
[illegible]

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH																							
1	Transformed Data																																																								
2	The order of the positive and negative term for an item is randomized in the questionnaire. Per dimension half of the items start with the positive and half with the negative term.																																																								
3	Here you can find the transformed values per item. You can use these values for example for own statistical calculations. The +3 represent the most positive and the -3 the most negative value.																																																								
4																													Scale means per person																												
5	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26		Attractiveness	Perspicuity	Efficiency	Dependability	Stimulation	Novelty																								
6	2	3	2	2	3	0	1	3	2	1	2	2	3	1	0	1	1	0	2	2	3	2	-1	-1	1	0		1.00	2.75	1.25	2.00	1.00	0.75																								
7	2	2	1	3	2	0	1	2	2	1	1	3	3	2	0	2	2	2	3	3	2	2	2	2	1	1		2.00	2.50	2.25	2.00	1.25	0.75																								
8	1	3	-1	2	1	1	1	3	3	0	2	2	3	1	0	1	2	1	3	3	3	3	3	2	1	1		1.33	2.75	3.00	2.50	1.00	0.00																								
9																																																									
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	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
2	Item	Mean	Variance	Std. Dev.	No.	Left	Right	Scale			UEQ Scales (Mean and Variance)				
3	1	↑ 1.7	0.3	0.6	3	annoying	enjoyable	Attractiveness			Attractiveness	↑ 1.444	0.26		
4	2	↑ 2.7	0.3	0.6	3	not understandable	understandable	Perspicuity			Perspicuity	↑ 2.667	0.02		
5	3	→ 0.7	2.3	1.5	3	creative	dull	Novelty			Efficiency	↑ 2.167	0.77		
6	4	↑ 2.3	0.3	0.6	3	easy to learn	difficult to learn	Perspicuity			Dependability	↑ 2.167	0.08		
7	5	↑ 2.0	1.0	1.0	3	valuable	inferior	Stimulation			Stimulation	↑ 1.083	0.02		
8	6	→ 0.3	0.3	0.6	3	boring	exciting	Stimulation			Novelty	→ 0.500	0.19		
9	7	↑ 1.0	0.0	0.0	3	not interesting	interesting	Stimulation							
10	8	↑ 2.7	0.3	0.6	3	unpredictable	predictable	Dependability							
11	9	↑ 2.3	0.3	0.6	3	fast	slow	Efficiency							
12	10	→ 0.7	0.3	0.6	3	inventive	conventional	Novelty							
13	11	↑ 1.7	0.3	0.6	3	obstructive	supportive	Dependability							
14	12	↑ 2.3	0.3	0.6	3	good	bad	Attractiveness							
15	13	↑ 3.0	0.0	0.0	3	complicated	easy	Perspicuity							
16	14	↑ 1.3	0.3	0.6	3	unlikable	pleasing	Attractiveness							
17	15	→ 0.0	0.0	0.0	3	usual	leading edge	Novelty							
18	16	↑ 1.3	0.3	0.6	3	unpleasant	pleasant	Attractiveness							
19	17	↑ 1.7	0.3	0.6	3	secure	not secure	Dependability							
20	18	↑ 1.0	1.0	1.0	3	motivating	demotivating	Stimulation							
21	19	↑ 2.7	0.3	0.6	3	meets expectations	does not meet expectations	Dependability							
22	20	↑ 2.7	0.3	0.6	3	inefficient	efficient	Efficiency							
23	21	↑ 2.7	0.3	0.6	3	clear	confusing	Perspicuity							
24	22	↑ 2.3	0.3	0.6	3	impractical	practical	Efficiency							
25	23	↑ 1.3	4.3	2.1	3	organized	cluttered	Efficiency							
26	24	↑ 1.0	3.0	1.7	3	attractive	unattractive	Attractiveness							
27	25	↑ 1.0	0.0	0.0	3	friendly	unfriendly	Attractiveness							
28	26	→ 0.7	0.3	0.6	3	conservative	innovative	Novelty							
29															
30															
31															
32															
33															
34															
35															
36															
37															
															
											Scale_Consistency	Benchmark	Inconsistencies		

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
2																
3	Confidence interval (p=0.05) per item								Confidence intervals (p=0.05) per scale							
4	Item	Mean	Std. Dev.	N	Confidence	Confidence interval			Scale	Mean	Std. Dev.	N	Confidence	Confidence interval		
5	1	1.667	0.577	3	0.653	1.013	2.320		Attractiveness	1.444	0.509	3	0.576	0.868	2.021	
6	2	2.667	0.577	3	0.653	2.013	3.320		Perspicuity	2.667	0.144	3	0.163	2.503	2.830	
7	3	0.667	1.528	3	1.729	-1.062	2.395		Efficiency	2.167	0.878	3	0.993	1.173	3.160	
8	4	2.333	0.577	3	0.653	1.680	2.987		Dependability	2.167	0.289	3	0.327	1.840	2.493	
9	5	2.000	1.000	3	1.132	0.868	3.132		Stimulation	1.083	0.144	3	0.163	0.920	1.247	
10	6	0.333	0.577	3	0.653	-0.320	0.987		Novelty	0.500	0.433	3	0.490	0.010	0.990	
11	7	1.000	0.000	3	#NUM!	#NUM!	#NUM!									
12	8	2.667	0.577	3	0.653	2.013	3.320									
13	9	2.333	0.577	3	0.653	1.680	2.987									
14	10	0.667	0.577	3	0.653	0.013	1.320									
15	11	1.667	0.577	3	0.653	1.013	2.320									
16	12	2.333	0.577	3	0.653	1.680	2.987									
17	13	3.000	0.000	3	#NUM!	#NUM!	#NUM!									
18	14	1.333	0.577	3	0.653	0.680	1.987									
19	15	0.000	0.000	3	#NUM!	#NUM!	#NUM!									
20	16	1.333	0.577	3	0.653	0.680	1.987									
21	17	1.667	0.577	3	0.653	1.013	2.320									
22	18	1.000	1.000	3	1.132	-0.132	2.132									
23	19	2.667	0.577	3	0.653	2.013	3.320									
24	20	2.667	0.577	3	0.653	2.013	3.320									
25	21	2.667	0.577	3	0.653	2.013	3.320									
26	22	2.333	0.577	3	0.653	1.680	2.987									
27	23	1.333	2.082	3	2.356	-1.022	3.689									
28	24	1.000	1.732	3	1.960	-0.960	2.960									
29	25	1.000	0.000	3	#NUM!	#NUM!	#NUM!									
30	26	0.667	0.577	3	0.653	0.013	1.320									
31																
32																
33																
34																
35																
36																

	A	B	C	D	E	F	G	H	I	J	K
1	much neutral judgements/may help to get deeper insights concerning aspects of the product that are experienced as quite positive by one subgroup of participants and quite negative by another subgroup.										
2	Nr	Item	1	2	3	4	5	6	7	Scale	
3	1	annoying/enjoyable	0	0	0	0	1	2	0	Attractiveness	
4	2	not understandable/understandable	0	0	0	0	0	1	2	Perspicuity	
5	3	dull/creative	0	0	1	0	1	1	0	Novelty	
6	4	difficult to learn/easy to learn	0	0	0	0	0	2	1	Perspicuity	
7	5	inferior/valuable	0	0	0	0	1	1	1	Stimulation	
8	6	boring/exciting	0	0	0	2	1	0	0	Stimulation	
9	7	not interesting/interesting	0	0	0	0	3	0	0	Stimulation	
10	8	unpredictable/predictable	0	0	0	0	0	1	2	Dependability	
11	9	slow/fast	0	0	0	0	0	2	1	Efficiency	
12	10	conventional/inventive	0	0	0	1	2	0	0	Novelty	
13	11	obstructive/supportive	0	0	0	0	1	2	0	Dependability	
14	12	bad/good	0	0	0	0	0	2	1	Attractiveness	
15	13	complicated/easy	0	0	0	0	0	0	3	Perspicuity	
16	14	unlikable/pleasing	0	0	0	0	2	1	0	Attractiveness	
17	15	usual/leading edge	0	0	0	3	0	0	0	Novelty	
18	16	unpleasant/pleasant	0	0	0	0	2	1	0	Attractiveness	
19	17	not secure/secure	0	0	0	0	1	2	0	Dependability	
20	18	motivating/demotivating	0	0	0	1	1	1	0	Stimulation	
21	19	does not meet expectations/meets expectations	0	0	0	0	0	1	2	Dependability	
22	20	inefficient/efficient	0	0	0	0	0	1	2	Efficiency	
23	21	confusing/clear	0	0	0	0	0	1	2	Perspicuity	
24	22	impractical/practical	0	0	0	0	0	2	1	Efficiency	
25	23	cluttered/organized	0	0	1	0	0	1	1	Efficiency	
26	24	unattractive/attractive	0	0	1	0	0	2	0	Attractiveness	
27	25	unfriendly/friendly	0	0	0	0	3	0	0	Attractiveness	
28	26	conservative/innovative	0	0	0	1	2	0	0	Novelty	
29											



	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
28	Attractiveness			Perspicuity			Efficiency			Dependability			Stimulation			Novelty	
29	Lambda1	0.53571429		Lambda1	-2		Lambda1	0.56756757		Lambda1	-3.997E-15		Lambda1	-6		Lambda1	0
30																	
31	Items	Covar^2		Items	Covar^2		Items	Covar^2		Items	Covar^2		Items	Covar^2		Items	Covar^2
32	1, 12	0.01		2, 4	0.11		9, 20	0.01		8, 11	0.05		5, 6	0.11		3, 10	0.31
33	1, 14	0.01		2, 13	0.00		9, 22	0.05		8, 17	0.01		5, 7	0.00		3, 15	0.00
34	1, 16	0.01		2, 21	0.11		9, 23	0.31		8, 19	0.01		5, 18	0.11		3, 26	0.20
35	1, 24	0.11		4, 13	0.00		20, 22	0.01		11, 17	0.01		6, 7	0.00		10, 15	0.00
36	1, 25	0.00		4, 21	0.11		20, 23	0.60		11, 19	0.01		6, 18	0.00		10, 26	0.01
37	12, 14	0.05		13, 21	0.00		22, 23	0.31		17, 19	0.05		7, 18	0.00		15, 26	0.00
38	12, 16	0.05		Sum	0.33		Sum	1.30		Sum	0.15		Sum	0.22		Sum	0.52
39	12, 24	0.11		Lambda2	0.83		Lambda2	0.72		Lambda2	0.47		Lambda2	-3.69		Lambda2	0.39
40	12, 25	0.00															
41	14, 16	0.05															
42	14, 24	0.11															
43	14, 25	0.00															
44	16, 24	0.11															
45	16, 25	0.00															
46	24, 25	0.00															
47	Sum	0.63															
48	Lambda2	0.67															
49																	
50																	
51																	
52																	
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54																	
55																	
56																	

