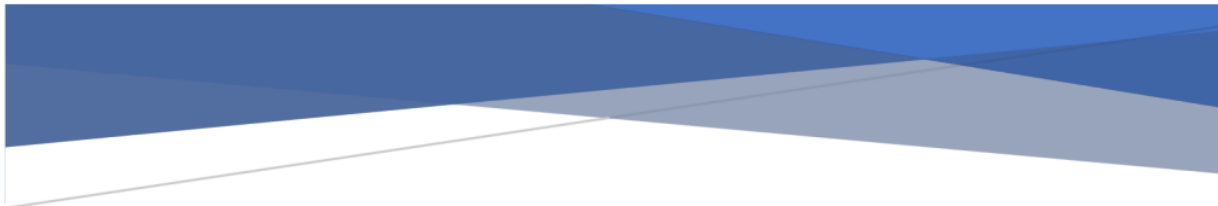


1803154_IwanJones

by Iwan Jones

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USABILITY ENGINEERING

ACCA6017

Iwan Jones
1803154

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Introduction

The following report investigates the display systems within public transport, the selected transport by the author was their local bus stop with the local routes that operate out of this stop. An evaluation of the existing display in conducted, while also proposing a new display with images to display the rough sketches before discussing the project steps that would be taken to test the application before finally, discussing the usability issues that Kuparinen talks about in their research paper that could pose a threat to this display and its operational functionality.

1.0 Public Transport System

1.1 Evaluation of Existing Display

The chosen location for this project is the local bus station to the user, as shown in figure one below. This project will look at creating a digital display replace the paper display currently in the bus stop, which has very poor usability. The analysis of this existing bus stop display will be carried out using human factor theory, then this theory will be applied to the re-design, more specifically, looking at visual perception, human memory, and reasoning before finally looking at interface metaphors and affordance. The current bus stop display can be seen in figure 2. Beginning with an evaluation of this stops displays, the visual perception was the first human factor to discussed. There is not much going on in this display on a positive note, the text is very close together, there is no use of font with different styles for hierarchy or contrast to “accentuate elements” [1] or any form of scale. All information blends into one. Looking at the human memory human factor to this timetable display, all the information is closely displayed together making it hard to differentiate between days and routes making it less straight forward for a user to memorise rather than splitting the data up into smaller sections [2].

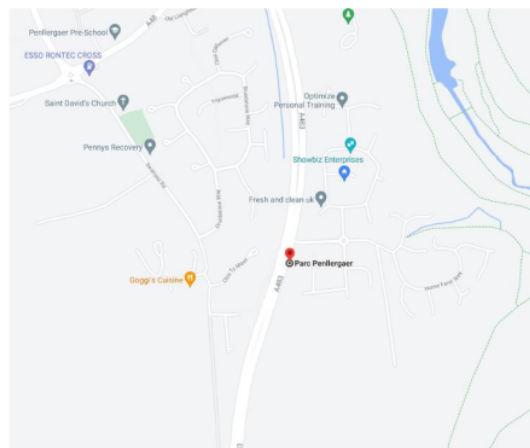




Figure 1

[illegible]



Figure 2

1.2 Proposed new Display

The proposed display can be seen below in figure 3. This is a rough sketch to what the user proposed, the first page, the home page, will be an interactive page with all information layout clearly to the user. The user initially will be greeted with several buttons that will display each of the routes that run through the chosen area, this takes into consideration, visual perception as with the buttons, each of these are separate and clearly contain their own data, which is split up through using shapes to create divisions on the page [1]. Looking at the human memory side, "People can't keep much information in their short-term memory" [3] which is why the data is kept to a minimum, initially with the buttons only showing, then to display the route times with added buttons to take the user to the route break down page. These buttons are also a use of affordance, as they would be made to look clickable to "presents a prompt on what can be done with this object" [4]. The two other pages, the route break down not being so interactive other than the affordance again on the map button, taking the user to an interactive map all follow suit to the same principles as mentioned on the home page.

[illegible]

Figure 3

Iwan Jones

Usability Engineering

1803154

2.0 Usability and Accessibility

2.1 Usability

To look at the usability of the proposed display, the following three topics were looked at in depth of this application, these were, "Learnability", "Efficiency" and "Errors" [5]. Beginning with learnability, the rough design created is very simple to operate around, there are not a massive amount of varying data, the only changing data is the route button and the timetable it will show below, while being very clear that in the timetable each time is a button. This makes it easy "for users to accomplish tasks for the first time" [5]. This ties in with efficiency, there are not large numbers of pages of the users to view, it's very simple as it contains what is essentially three pages, for user to look for times of a route it is very efficient to see on the home page, likewise the route breakdown page is very clear and show the user all the information clearly. The final guideline to be applied is error prevention. This looks at "how many errors do users make" and how critical these errors are [5]. This proposed design does not leave much option for errors to be made, the only error a user could make would be clicking the wrong time which can easily be rectified by the click of a back button. If this were to be a mobile app, routes would need to be protected, especially if there were a login option, the user once logged in should not be able to access the login or register page for that matter.

2.2 Accessibility

Applying accessibility guidelines to the proposed display board is more challenging than the usability guidelines as it is very hard to implement assistive technology. As stated on the W3C accessibility guideline website, "images should include equivalent alternative text" [6], which can be applied to the images on the display. For the buttons however, aria-labels can be applied, these labels are invisible to user who do not need assistive technology whereas a screen reader can read these labels and provide relevant information to the user [7]. Applying these techniques does open the option to using assistive technologies like screen readers on these displays. To make the proposed display accessible to the visually impaired a sound output option could be added so that when a user plugs in their headphones it prompts the display to output the text using a screen reader, while using braille to add the instructions to tell the user this is available, likewise, making these displays very accessible physically so that wheelchair users can also use without issues [8].

3.0 Usability Evaluation

The following section is on the usability evaluation beginning with the review of the existing system of displays to the new implementation of the proposed system and how this project would be outlined.

3.1 Current System Review

To start the project, the current system in place would be put through system task analysis. This will be completed by reviewing multiple user interviews and conducting questionnaires from the local area to see what their thoughts are on the current A4 paper display ([figure 2]). These reviews will be taken into consideration in the rest of the project. The task analysis will gather information on five areas, what triggers a user to start a task, the outcome they wish, their base knowledge before starting a task, what they need to know to start a task and what tools they'll use during a task, stated as the five main areas of research in the Interaction Design website on task analysis [9]. This type of test can be done by asking a group of users to complete tests, in this case, as the users to find a certain bus route, and locate an appropriate time. Feedback from the users will be taken to find out what they thought of the display and if it could be improved [10]. This evaluation would highlight the issues with the current system from a user point of view and make it clear on the issues that the new system must solve.

3.2 Requirements from users

The next step of this process would be to gather requirements for the new design, this would consist of taking into account the feedback from the user reviews from the first application before interviewing the same user to find out what they would like to see on the display which will lead into how the display flows. This is important as the whole display is about solving the problems that the user have with the existing paper displays. Next, the system requirements will be set, which is to display all relevant data to the bus routes and times while also adhering to the usability and accessibility guidelines [11]. By setting these requirements, this makes it much more straight forward to be able to base the designs around solving the issues and meeting the requirements, looking at each feature to be designs to meet each requirement.

3.3 Prototyping

Prototyping is another usability evaluation technique that would also for more in-depth review to be carried out. Prototyping allows users to get a feel for the final product of the display, this allows additional features to be added or changed if they did not meet user requirements before implementation, while also being able to check the usability of the proposed display as the navigation can be tested again tasks such as search bus times and routes which will be the tasks the users will be using the display for. The prototyping allows for an expert usability test to be run against usability guidelines as well as matching it up with the requirements set before implementation [12].

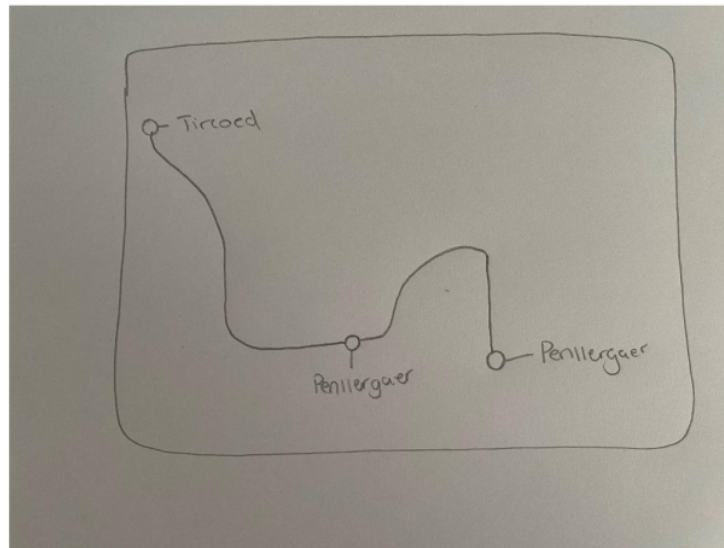
3.4 User based lab tests

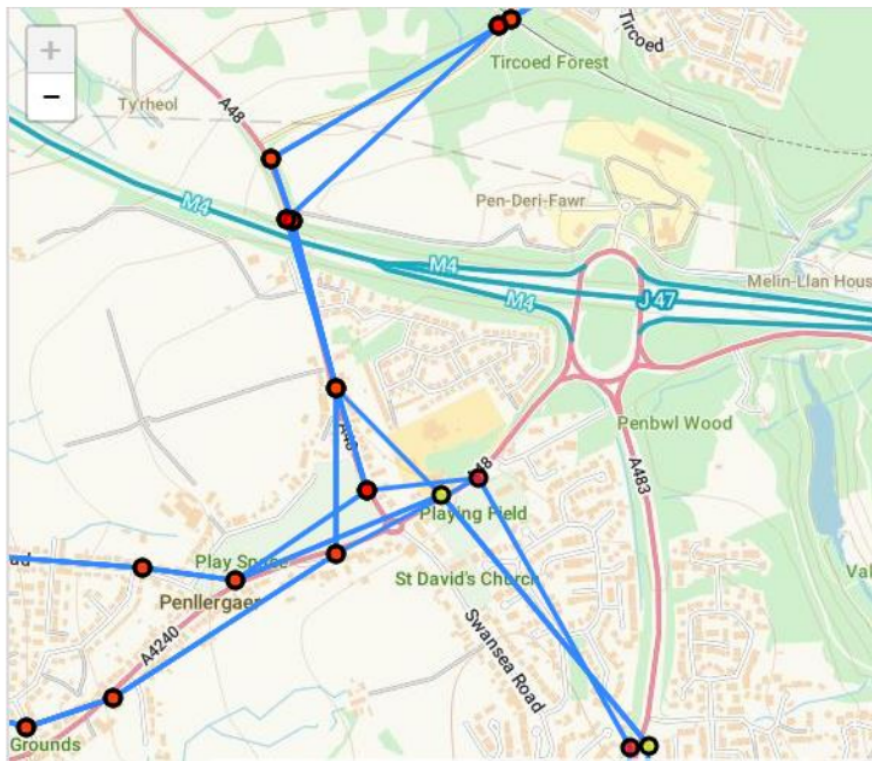
Finally, the last of the evaluation methods would be the user-based testing of the implemented system before release. This final test will consist of tasks that the user must complete while setting the goals of the test to see if the users meet these goals, while a variety of different abilities will be selected to run these tests. The user's ability to complete a task at easy, learn the display, and avoid errors is just as important as the app meeting the user satisfaction in terms of aesthetics. This user-based tests also act as acceptance testing as if there are any flaws in the system, they can be rectified before deployment, however the if the system passes the tests, then these tests make it clear to see that it is ready [13].

4.0 Analysis

This section will analysis and evaluate the proposed design for the interactive map in the designs seen in figure [3] compared to the current map in place from this bus stop which can be seen below. There are some usability challenges in the implementation of the proposed system as well as the map display. The map in the sketch below would be a simple animation from bus stop to bus stop, beginning where the user is and show the continuation of the route the bus will take, allowing the user to visualise where their stop is in comparison to the buses journey. Usability challenges of this map as state by Kuparinen, "the small screen size of the mobile device, interaction limitations of the device, connection speed and limited battery life" [14]. This is a large problem for this device, battery life has the potential to be solved by having solar panels in place to charge on board batteries to the unit, connection speed can be solved by having the on-board software and data all stored on each individual device, however this is not very practical leaving this as a rather large accessibility issue. Interaction limitations would refer to a possible blind user, who would not be able to see the map, an audio feature could be added to the screen itself, however, this would prove the same information on the previous route screen.

On the whole, the design choices of this proposed system does solve many issues with the paper display, this would only be confirmed with real life user testing, which the author has no doubt that the previous issues discussed would arise, and would need to be look into in much more depth.





Conclusion

To conclude this report, the proposed system would make a real difference in not only the interaction of users of public transport but also to try and add more enjoyment to the process by creating more involvement of a user selecting a route and viewing where they would go. It is clear the proposed testing in the usability evaluation would be vital in the success of the display, however, there are most definitely some problematic areas that would need to be investigated more, as stated in the previous section.

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FINAL GRADE

60/100

GENERAL COMMENTS

Instructor

1. Analysis and Design

Outline and photos of current resources with some application of human factors theory. Apart from the poor readability and structure there could be other info needed by travellers on bus routes, fares, destinations etc. A design sketch presented. 17/25

2. Guidelines and Accessibility

A brief analysis is given, with good examples chosen.. for both general guidelines and accessibility. 17/25

3. Evaluation Strategy

An outline of usability evaluation activities in the project lifecycle is given. Benefits and examples given and simulation addressed under Lab based heading.

17/25

4. Map Usability

Map examples presented but little discussion.

9/25

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