

Cieran Hughes Report

by Cieran Hughes

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Computing

Usability Engineering

Research and Analysis of Smart Public Transport System

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1. Introduction

This report will be split up into four sections. The first section will have an explanation of the chosen public transport location, then provide a critical analysis of the public information system. Following this will be the new outlined designed idea. The second section will apply the usability and accessibility guidelines to the proposed system. The third section will outline the evaluation techniques if the usability and accessibility thought the design process of the proposed system. The final section will give an analysis of the map usability in the proposed public information system.

2. Section 1

2.1 Critical Analysis of Existing Location

2.1.1 Existing Location

The existing location chosen for this task is a bus stop in Southerndown. This bus stop is used for the route of the Vale of Glamorgan coast route ending in the main station of Bridgend. There are several busses that stop at this location at different times on different routes and the information provided by the bus stop is very limited. As seen in Figure 1 the bus stop has a shelter with information inside. This information is written on paper and is rarely updated as it is hard to do, an in-depth image of the display can be seen in Appendix 1 – Bus Information and the location on Google Maps can be seen in Appendix 2 – Map Location.



Figure 1 - Southerndown Bus Stop

2.1.2 Task Analysis

The main users of the system will be people who either live in the local village and want to travel out, or people leaving the local area to go to a different stop. The users' ages can vary from really young to old. The task now is performed by going and reading the outdated times to hope the bus correctly on the schedule. The desired task is for the user to either look at and application on their device or go to the stop and see the routes, times at each stop and expended buses at the current stop. The tasks are performed in the bus stop using the information provided and the task is undertaken daily buy

local people who use the bus. Finally, if something goes wrong then the user will not be able to catch the bus therefore stopping them travel and therefore not able to attend the reason for travelling.

2.1.2 Human Factors Theory

2.1.2.1 Affordance

When looking at the existing system there is very limited affordance to no affordance. The main reason for this is there is no user interaction features as the paper in the display cabinets are static. The small amount of affordance is how the user views the tables on the paper. The tables are centred on the paper and there is no content around the tables so the user eye will be drawn to it first [1][2]. This human factor theory point needs to be heavily improved on in the new proposed display.

2.2 Preposed Display

The new proposed system will include a screen mounted under the shelter. This screen will house the same information on as the paper tables but with a better usability and more information. As seen in the sketch in Figure 2 – Preposed UI on the Screen, firstly the screen will have the main section of a table with the bus stop and the time expected of each route that stopes on at the specific spot. This spot will be highlighted to stand out to the user improving the human reasoning. Then on the display there will be a QR code for the users to scan. This will open the web app or application if it is installed on the device showing the bus times that can be interactive with but also the location of the bus so the user can see if there are any delays or problems at that time. The display will also have an information box that can show any critical information. The proposed location of the screen can be seen in Figure 3 – Screen in Bus Stop.

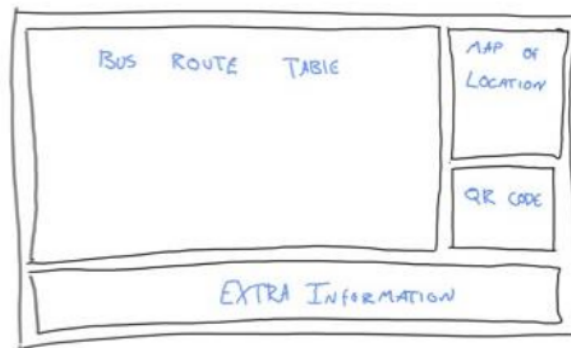


Figure 2 – Preposed UI on the Screen

11:45 Monday 10th May

	12:00	13:00	14:00	15:00
Bridgend	12:05	13:05	14:05	15:05
Eweng	12:13	13:13	14:13	15:13
Ogmore	12:18	13:18	14:18	15:18
Southern Down	12:22	13:22	14:22	15:22

Key Information
202 bus route is running 2 mins late times are updated

QR code

Figure 3 – Screen in Bus Stop

3. Section 2

3.1 Usability Guidelines

The usability guidelines that will be looked at for the proposed displays usability are the Shneiderman's guidelines. One of the first main guideline are consistency and perceived stability [3]. This is ensuring that the colours and way the information is conveyed is the same thought the pages of the display and application. This is to ensure the user can notice the same key information on every page on both interfaces and not have to relearn the new representations when moving thought the system [3].

Another point that links to the consistency of the displays is the reduction of the short-term memory load. This is keeping the menus and overall design simple as the user can only make decision on seven pieces of information at once [4] so the information being shown needs to be kept to that [5].

3.2 Usefulness of Usability Guidelines

Overall, most of the points that the usability guidelines present can be applied to public use displays but there are some points that do not provide good advice. An example of one of these points is the error message handling on the display screens. These should never show any errors as this will inform the user that there is a problem with the system and the bus time are wrong. Any failings with the buses should update the times and inform the user by changing the times colour.

3.3 Existing Web Accessibility Guidelines

The existing web accessibility guidelines are good for web interfaces designed for normal sizes displays. When looking at the W3C Web Accessibility guidelines and applying them to the display designed for this project there are some points that is does not meet. As an example, one of these is the Visual Presentation for blocks of text when looking at the point of 1.4.8 Visual Presentation Level AAA of the W3C [6]. There are multiple other accessibility guidelines such as W3C [7], W3C Mobile [8] and Usability Gov [9].

3.4 Specialist Set of Usability Guidelines

Once looking at the existing accessibility guidelines there should be an address set of guidelines for public displays. One of the main reasons for this is that the display will need to be consistent with other parts of the system that will be used in multiple places such as the app on the phone. So, to combat this the added set of guidelines need to have sections for each device. Also, the main screen in the bus stops and at the station will be big and have multiple people looking at it from multiple angles so this needed to be taken into consideration when building the new guidelines, as none of the existing one's accommodation for this.

4. Section 3

4.1 Wireframe

The first stage of design is the wireframe diagram. The human factors theory could be applied to this stage of design but mainly the affordance and visual perception aspects of it. Applying these would allow for the layout and content placement to be ensured.

4.2 Paper Prototype

Following the wireframe diagram is the paper prototype design. This is a more in detail design to the wireframe diagram. This usability of this design would be evaluated by the human factor's theory also. This reason this is chosen it with all the added content it can be built upon from the last evaluation improving it further, using all the aspects of the evaluation technique.

4.3 Software Prototype

This is the main section where the usability will be evaluated. Once the first design is done it will be evaluated against using the Shneiderman's usability guidelines. This is the one that is chosen as I can get a really efficient and well designed end UI as the guidelines allow for this. It can be backed up by Apple incorporating the Shneiderman's usability guidelines into their design guidelines for the OS and all web applications and applications they provide [10].

4.4 Simulation

Following this there will be a second software interface design produced gaining on the research gathered in the previous evaluations. This will also be evaluated but use an interactive software simulation tool like Adobe XD. This will heavily improve the usability as more guidelines can be evaluated following the easier use of the system and how it will feel when the user is navigating through the screens.

5. Section 4

5.1 Current Maps in UI

There are multiple usability challenges when including a map in the user interface of an application. The first one is colour, there are multiple challenges within the colour aspect. The map needs to stand out so the chosen colours on the map need to contrast the background colour [11]. The reason for this is so the user can distinguish between the map and the other content on the screen, so it is not all blending in to one. Also, the colours need to be consistent throughout the system, but not use the colours that are being used on the map otherwise they will clash with the other elements on the screen and confuse the user with a busy interface [11][12].

The second usability challenge is the navigation of the map itself. When the user is scrolling around the page they should not be able to miss scroll on a page and send the map flying or try scroll on the map and scroll the page down [13]. This is down to the design also as the pages are shown on many screens the use with a mouse or touch screen needs to be incorporated for.

Finally map tools are a challenge when developing a map based interface. The user needs to be able to interact with the map and use the necessary tools for the map to be functional on the page. Some of these tools are the zoom buttons, scale bars and place information [12]. If these tools are not accessible for the user then the map on the page loses its function and therefore rendering a big space on the page useless.

5.2 Public Information System Map

The provided sketch Figure 4 – Map Based Interface can be accessed on any devices through the web browser and will be responsive to the device size with the map as a focus point.

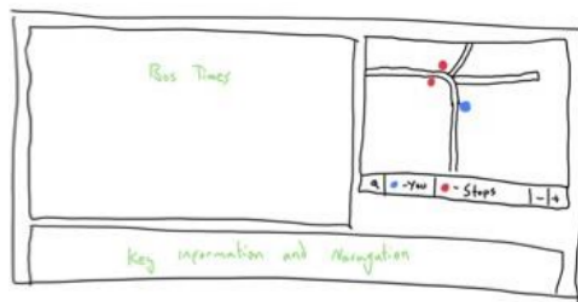


Figure 4 – Map Based Interface

When providing an analysis on the interface created and looking at the proposed guidelines by Kuparinen [14], firstly the user point on the map is in the centre with the bus stops clearly marked. This meets the first guideline of 'Match the map and the physical surroundings' [14]. This is important as it will stop the user getting lost when following the map.

Another point of the proposed guidelines by Kuparinen is the flexibility, adaptability, and scalability [14]. This guideline is met as the interface that is designed is responsive to all the screen sizes so can be scaled to a smartphone screen or tablet up to the public display screens. This has lots of advantages

to the user as they can carry on their research on the local bus stops on different devices as they are travelling around.

When looking at all the guidelines overall they are all effective and useful to a project that has a user interface that is designed around a map.

6. Conclusion

This report outlined the major usability guidelines when designing a system that is designed around map use. There are also sections in the report that outline the major accessibility guidelines. These all give improvement to the proposed system but importantly give an analysis of the guidelines and if they are actually effective for public displays.

7. References

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8. Appendices

8.1 Appendix 1 – Bus Information

8.1.1 Main Display Information



[illegible]

Cieran Hughes Report

GRADEMARK REPORT

FINAL GRADE

59/100

GENERAL COMMENTS

Instructor

1. Analysis and Design

Outline and photos of info available to travellers - how well does this inform someone who has never used the route before?

Usability theory topics applied. In the Task Analysis section, users don't want an app as such, just the travel info. Is the task always performed at the bus stop or can the journey be planned at home? Good outline of user characteristics. Outline designs presented. 16/25

2. Guidelines and Accessibility

A brief analysis is given, with good examples included. A less helpful guideline is included. I agree that error messages are not useful at public transport interchanges, sometimes I see Windows error messages on bus or train displays including press any key to continue when there is no keyboard! Accessibility issues are not considered. 14/25

3. Evaluation Strategy

An outline of usability evaluation activities in the project lifecycle is given. Some sensible suggestions. Simulation is useful because there may not be opportunities to engage with travellers at the bus stop, they need to travel!

13/25

4. Map Usability

Map usability challenges are briefly outlined with references to relevant research. A useful map sketch is presented which addresses the needs bus users as compared to general purpose maps and explanation in terms of Kuperinen's guidelines.

16/25

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