The design of a web application to act as a hub of services for the transgender community in Liverpool

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A person holding a flag

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Figure A transgender flag being waved at LGBT gay pride march by ‘ink drop’ used under Standard License from Adobe

Contents

[1. Preparation and planning 3](#_Toc133958597)

[1.1 Title and scope 3](#_Toc133958598)

[1.1.1 Title 3](#_Toc133958599)

[1.1.2 Revised description 3](#_Toc133958600)

[1.2 Resources 4](#_Toc133958601)

[1.3 Future Plan 6](#_Toc133958602)

[2. Project work completed 8](#_Toc133958603)

[2.1 Literature review 8](#_Toc133958604)

[2.1.1 Requirements 8](#_Toc133958605)

[2.1.2 CSS 9](#_Toc133958606)

[2.2 Project Work 10](#_Toc133958607)

[2.2.1 Requirements elicitation 10](#_Toc133958608)

[2.2.2 User Interface design 13](#_Toc133958609)

[3. Review and reflection 17](#_Toc133958610)

[3.1 Ways of working 17](#_Toc133958611)

[3.2 Evaluating project management 19](#_Toc133958612)

[3.3 LSEP and EDI 19](#_Toc133958613)

[4. References 21](#_Toc133958614)

[5. Appendix A: Questionnaire 22](#_Toc133958615)

# 1. Preparation and planning

## 1.1 Title and scope

### 1.1.1 Title

The design of a web application to act as a hub of services for the transgender community in Liverpool

### 1.1.2 Revised description

There are many vital services available to the transgender community in Liverpool, but it can be a challenge to find them. This is particularly the case for new members of the community who may be in a vulnerable situation, as the point of coming out is a huge life change that may be accompanied by mental health issues and the loss of relationships. This is compounded by transgender healthcare facing profound ignorance (and in some cases outright bigotry) from many GPs, who may attempt to block or delay attempts at medical transition, alongside extreme waiting lists for appointments at Gender Identity Clinics.

The trans community attempts to solve these issues in numerous ways, mostly informal (e.g. by word of mouth in group chats), but two more formal ways are the Liverpool Trans Wiki (TransLiverpool Wiki, 2023) which catalogues and comments on many services that are available; and the Spirit Level peer support group which invites in guests from services to explain what they offer to the community. The proposed web app will seek to build on these solutions and incorporate this specialist knowledge into it.

The web app will be usable on web browsers and on mobile devices using HTML, CSS, and JavaScript and will utilize the OpenStack Trove DBaaS, consisting of several pages. Firstly, a page that contains a map which displays services on it, which will be filterable by type (e.g. mental health or peer support) and when a service is selected more information and contact details will be provided. The map will also provide directions from the user’s location to the selected service. Another page will contain a search function for a database which will return services based on user queries. There will also be a page that will contain an events calendar. The app will be designed such that information will be one way, to protect the user’s privacy and limit the amount of sensitive data stored by the app. Ethical considerations are vital for the project, since some users may not wish to be open about their trans identity and therefore would need to conceal their use of the app. This must be at the forefront of the final product to reassure users that their identity is safe.

The requirements elicitation will also explore another feature, a map which displays the location of gender-neutral toilets at businesses such as cafes, restaurants, and pubs. However, this will be considered for further work beyond this project and will be considered out of scope to keep the amount of development to an achievable level. The scope of the project is for services in Liverpool & Merseyside due to the ability to engage with services and their users directly and due to already existing knowledge. However, if successful the app could be expanded to cover the whole of the UK, it would be a matter of gathering the data rather than any technical challenges. Also out of scope would be online only services that have no physical footprint in Liverpool & Merseyside, some of these may be included in an ‘important links’ page but not as part of the core services covered by the app. The scope of the services included is that they must offer something specific to the trans community, rather than broader services (e.g. the CMAGIC & TSS counselling services would be included, but not the general NHS counselling service offered by Talk Liverpool.)

## 1.2 Resources

The resources focused on previously involved gathering feedback from services and members of the community, and while this is very important for a full release, for the purposes of this project it has been scaled back. While feedback is important, too much time focused on it would not leave enough time for other aspects of development. This aspect of the resources list has been condensed and other essential resources added.

* Representatives of services e.g. manager of a laser hair removal clinic
  + Can offer feedback about the events system and the ways in which users can contact their service.
  + May offer vital perspectives of how the app effects the community
  + **Risk** (medium impact, medium likelihood): They may be busy and do not wish to engage with giving feedback or may only engage in a limited way. To mitigate this, try to identify which people will be willing to provide feedback and be respectful of their time, to get as much out of any engagements as possible.
* Members of the Liverpool trans community
  + Different members of the community may have different needs regarding accessing services.
  + Could offer feedback on prototypes of the app.
  + May be a source of information about services that should be included.
  + The Liverpool Trans Wiki may an essential source of community information about the services, as it documents many of them.
  + **Risk** (medium impact, high likelihood): Feedback may be not useful or relevant. To mitigate this, care must be taken when designing questionnaires with a balance between closed and open questions.
  + **Risk** (high impact, low likelihood): They do not wish to engage with giving feedback or only engage in a limited way. To mitigate this, likely contributors will be engaged with early on. If necessary, a change to the project lifecycle could be considered.
* Programming languages
  + JavaScript – proficient enough to tackle much of the proposed features, but some learning may be required as it will likely extend beyond current knowledge.
  + HTML – reasonably proficient, significant problems are not anticipated.
  + CSS – only minimal experience, may need some time to learn and to use trial and error to achieve goals.
  + SQL – a small amount of experience that should be sufficient for a simple database, but for anything more complex some learning may be required.
  + **Risk** (medium impact, high likelihood): Attempting to code non-routine tasks may cause significant delay. To mitigate this, the schedule will be adjusted to include skills development as necessary, particularly for CSS.
* Visual Studio Code
  + A commonly used code editor that will be used throughout the project for all coding purposes.
  + **Risk** (low impact, medium likelihood): Since this is the first time using this software, there will be some adjustment time to using it. No mitigation should be required since the primary purpose of the software is very similar to other code editors, and any shortcuts learned will only speed up tasks.
* Cloud storage and version control
  + Microsoft OneDrive and GitHub can be used to backup files in the cloud and continue work between different devices. GitHub also provides version control with branching and reverting.
  + **Risk** (high impact, low likelihood): Data loss in the cloud, this could be due to several reasons including accidental deletion and server failure. This is not very likely but could be catastrophic to the project if significant amounts of work were lost. To mitigate this, copies of the data will be stored locally on multiple machines as well as in the cloud, so there is no single point of failure.
* OpenStack Trove DBaaS
  + A database solution, which is free and open source and will be used to store all the data for the services
  + **Risk** (medium impact, medium likelihood): Setup of the database taking longer than anticipated, since previous work with the database was after it had been set up. Mitigate by working on this as soon as possible to ensure there is time to work through any issues.

## 1.3 Future Plan

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Figure Schedule of tasks part 1

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Figure Schedule of tasks part 2

# 2. Project work completed

## 2.1 Literature review

### 2.1.1 Requirements

The first part of the literature review was relating to requirements including how to identify them, the differences between functional and non-functional requirements, their elicitation and analysis. This will be crucial to the project, so the goals and boundaries of it are clear, what the expected outcomes are and what characteristics it should have. The goal was to find sources that cover all these aspects of requirements, and unlike other literature reviews for this project the date when written is less crucial here, as this subject has not changed over time in the same way that a technology might.

Nilsson & Fagerström (2006) discuss the analysis of requirements once stakeholders have been consulted and how to balance their potentially competing interests to aid in the decision-making process. Furthermore, they outline a method of analysis considers different needs stakeholders might have and the extent to which requirements may meet them. They outline a method of collating all this in a ‘stakeholder and requirement matrix’ as shown in figure 4. This piece of literature is a research paper that was published in the Computers in Industry journal and has been widely cited by other academics, so can be seen as a trustworthy source.

A picture containing text, crossword puzzle, receipt

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Figure Example Stakeholder and Requirements matrix

Robertson & Robertson (2006) provide a detailed overview of requirements, covering topics such as what requirements are, why they are important and the process of writing them. It also covers the Volere Requirements Specification Template that was pioneered by Robertson & Robertson with others, that forms a foundation and structure for requirements specifications. This book covers important foundational concepts and informed the TM354 module on software engineering, so can be considered a trustworthy source.

These sources will provide both different, complimentary ways to consider and analyse requirements. Both the stakeholder and requirements matrix and Volere template are useful tools that can be utilised, but care must also be taken that they are used in a proportionate way for this project. Using them to their full potential would take a very significant amount of time and as previously stated, so care must be taken to use shortened versions which will still be elucidating and provide context for discussion on future. The textbook for TM354: Software Engineering Block 1 Units 1-4 From domain to requirements (The Open University, 2014) does this with the Volere Template and so will be a useful resource as an example of narrowing this down.

### 2.1.2 CSS

The second part of the literature review was on sources related to skills development for CSS, to assist in the development of the visual elements of the user interface. Previous modules such as TM352 did not cover CSS in much detail, so the goal was to learn enough basic CSS to create a simple, but functional appearance for the app. Since the CSS language is being continually updated, more recent sources were preferred, though some older sources may still be of use since the basics of the language have stayed the same.

Gray with CSS Tutorial – Full Course for Beginners (2022), produced an extensive video tutorial for freeCodeCamp on CSS starting at the very basics including fonts and colour changes. It also covers grid layout and flexbox, as well as media queries which may be useful to ensure that the app maintains the intended appearance on different devices. The tutorial also covers accessibility issues, for example mentioning how code will affect the way screen readers will read the page, so it also will be a useful resource to ensure FreeCodeCamp is a charity founded by a teacher to provide free online courses teaching coding and has other learning materials that may be useful going forward for the project, for example on JavaScript and REST APIs, if required. Gray is a lecturer and PhD student at Fort Hays State University and has produced many teaching resources on web development. This source will be a useful starting place to learn the basics of CSS and could be combined with another source such as a textbook to fill out knowledge gaps as needed.

Meiert (2015) in ‘The Little Book of HTML/CSS Coding Guidelines’ provides guidelines for coding, explaining good practise and the reasons for it. For example, naming classes/IDs so they properly reflect the purpose of an element and are ‘as short as possible but as long as necessary’. This will help ensure that the code is consistent and easy to read, both for other people but also for myself as the project goes on, the amount of code expands and there is a need to return to code written months earlier. Similarly, the W3C markup validation service (2023) will help ensure the code is valid and using proper syntax.

There are numerous books on HTML and CSS which would be suitable for skills development for this project, so there must be a degree of arbitrary choice when considering which one to use. Web Design Playground: HTML and CSS the Interactive Way (McFedries, 2019) is a more recent one, ensuring that newer updates to the language can be covered if necessary. Additionally, the author has written many other books which have sold ‘over four million copies’ on the web development and related topics, so can be considered reliable source when covering an introductory topic. The Book covers the basics of CSS and HTML including topics such as pseudo-elements and how the cascade and inheritance work.

These sources will give a solid grounding in CSS, combining audio-visual and written learning to aid in the skills development required for the project. They will also help consider accessibility issues as development continues, to ensure that the app is still pleasant to use for people who use screen readers, have colour blindness or any other potential barriers to using the app.

## 2.2 Project WorkY

### 2.2.1 Requirements elicitation

Initially the project description was reviewed to identify some potential requirements, these would represent the outline of what the system as initially proposed would deliver. The next step would be to consult with stakeholders so that their feedback could potentially confirm they were correct, remove them entirely, or adjust them. These proposed requirements are outlined below.

The system shall:

* FR1: display services for the transgender community in Liverpool on a map.
* FR2: provide information and contact details for each service.
* FR3: have tags to show or hide the services displayed on the map.
* FR4: show directions to the location of a selected service.
* FR5: have a searchable database of services.
* FR6: display events related to the services or for the community in a calendar.
* NFR1: give the user control over privacy.
* FR7: display the location of businesses with gender neutral toilets on a map.

Using the classes of non-functional requirement identified by Robertson & Robertson (2006), NFR1 could possibly be considered a legal requirement (due to legal requirements of handling sensitive data) or a security requirement (due to maintaining confidentiality). However, it could also be described a cultural requirement since there are unique aspects to the trans community that go beyond what might normally be considered ‘privacy’, such as the name of the app and when notifications may occur.

Nilsson & Fagerstrom (2005) suggest constructing a ‘stakeholder and requirements matrix’ which can be used to show “a rich picture of all the stakeholders” and the relative importance of their needs. As previously discussed, the amount of feedback sought from stakeholders has been scaled down to be manageable for the scope of this project, so only a partial matrix will be constructed, but a full release that elicited more responses could flesh it out further. A questionnaire was therefore designed to elicit responses from stakeholders that would assist in both the creation of the matrix and to get feedback on the proposed requirements. Participants were asked how useful a feature (that that delivered a proposed requirement) would be to them; to rate the importance of it; and for further feedback, as shown in figure 5. A full copy of the questionnaire is included in Appendix A.

![Table

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Figure Example question for stakeholder elicitation

When analysing the completed questionnaires, the goal was to see if any changes to the requirements were required; to identify the needs of a stakeholder group; to match how well a requirement meets that need and to be aware of any unexpected feedback that may elicit entirely separate requirements. There were three respondents to the questionnaire (the implications of this are discussed in section 3.1) who were potential users of the application, rather than service providers, so the analysis will focus on this single stakeholder group.

Responses indicated that FR1, FR2 and FR5 all were valid for this stakeholder group and will remain unchanged, some key quotes are:

* *“it would allow me to find what services are nearest rather than just what services are beat advertised”* (FR1).
* “Yes it would help to find what is accessible nearby especially if someone can’t access support during the day due to commitments or work” (FR2)
* “Yes, searching by the name/description of the service would be good” (FR5)

A stakeholder need can also be identified from this feedback:

* *N1.1: Finding a service that I need to access*

This is the core need that the app is attempting to fulfil, and all respondents rated this as of high importance to them. All respondents felt that there was some difficulty for them in finding and accessing the services that are available to them.

FR3 elicited a lot of suggestions about how it might be delivered, perhaps suggesting that it was vaguely worded. The feedback also indicated that users would value personalising their use of the app to tailor to their individual situation. As discussed in section 3.3, there are different experiences under the ‘trans umbrella’ that the app should try to cater for, such as transfeminine, transmasculine and non-binary. A key quote is:

* *“I wondered about a tag could be selected to specify services intended for specific people ie just trans women/men like make up support”* (FR3)

Therefore, FR3 has been amended to:

* *FR3: have tags to show or hide the services displayed on the map, based on type of service and the gender identities they provide for.*

Additionally, a stakeholder need can be identified from this feedback:

* *N1.2: Personalise the experience of finding services to my identity*

For FR6 there was a lot of feedback that users find it difficult to find out about events because they are spread across multiple places such as Facebook groups and discord servers. It highlights a problem that with this functional requirement that in delivering it there would be a risk that this would be simply ‘another place where events can be created’ and would potentially exacerbate the problem that users have rather than improving it. A key quote is:

* *“It’s hard to keep track of events, some are on Facebook, some by discord, so a central location would be lovely”* (FR6)

Therefore, FR6 has been amended to:

* *FR6: collate existing events for the community from other sources, in a calendar.*

A need can also be identified:

* *N1.3: Find out about community events*

Previously it has been stressed that maintaining privacy and safety of users is crucial to the project, both from a moral and reputational point of view. This community anxiety is highlighted by an unpromoted in response to the question about the filter tags:

* "not sure if this might allow terfs to find and cause problems for those services/users who attend that place?”

This is an important consideration for the app fundamentally, that while increasing the visibility of services is a positive thing for the trans community, that visibility may also increase for those who would do the community harm. However, this does not require change to NFR1 and other feedback indicated that this requirement was valid. A key quote is:

* “it would help with feeling safer particularly before coming out” (NFR1)

A need can also be identified:

*N4: Maintain my safety and privacy when using it*

Feedback also indicated that FR4 was not important to users, as they have other apps they use to give them directions. Additionally, many services require some interaction or planning before using them, so a user would not likely go to the service directly and instead make an appointment. A key quote is:

* “Not particularly useful to me as I use google maps for navigation. A simple link to a maps provider would do for me” (FR4)

Therefore, FR4 has been removed entirely.

Table 1 below is the resulting stakeholder and requirements matrix. The extent to which a requirement meets a need is expressed as either none, low, medium, or high. This was parsed from the priority that users gave in their responses but also by interpreting their written responses and an understanding of how the requirements and needs will interact.

Table Stakeholder and requirements matrix work in progress

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | FR1 | FR2 | FR3 | FR5 | FR6 | NFR1 |
| Trans community app users | N1.1 | H | H |  | H |  |  |
| N1.2 |  |  | H | M |  |  |
| N1.3 | L | L |  |  | H |  |
| N1.4 |  |  |  |  |  | H |
| Service providers | N2.1 |  |  |  |  |  |  |
| N2.2 |  |  |  |  |  |  |

Further analysis will be conducted to produce user stories from the feedback that has been gathered, and then all of this will be collated in a condensed version of a Volaire template. So far only one non-functional requirement has been considered, so more could be identified and as development continues further requirements may emerge.

### 2.2.2 User Interface design

As explained previously, some skills development was undertaken by studying Gray’s CSS Tutorial – Full Course for Beginners (2022) and McFedries’ Web Design Playground HTML and CSS the Interactive Way (2019). The goal was to gain enough knowledge to produce a simple, but effective layout that would maximise screen space to ensure that information is legible to the user, while taking into consideration accessibility issues (discussed in section 3.3). Previously three types of designs were considered, a design similar to Google maps, a design with menus that slide in from the sides and a very simplified design and the conclusion was that a balance would have to be struck between investing time on learning how to produce these designs and spending time on other critical aspects of the project.

The first task was to create a simple menu bar and decided to start by using an unordered list to do this. Initially a horizontal bar was considered, but on reflection this may have taken up unnecessarily screen real estate, so instead, it was adapted into a drop down ‘hamburger’ menu as Gray and McFedries both illustrate. This was achieved by utilizing the transition property and a hidden checkbox to activate the menu, with figures 6 and 7 showing it with the menu closed and open.

![A picture containing graphical user interface

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Figure Drop down menu closed

![Text

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Figure Drop down menu open

While this may be adequate, it seemed relatively simple to change this to emulate the ‘sliding menus’ design sketched in TMA01 by having it transition horizontally rather than vertically. This opens and closes by tapping/clicking the ‘hamburger’ icon, though the original concept conceived of it also opening using swipe gestures, this is something that could be added later in the project. Placeholder buttons for the service tags and a placeholder container for the map (which has a green colour, so it is visible for development) were also added. This is shown in figure 8.

![Graphical user interface, application

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Figure horizontally opening menu

The same technique was used to add an info box that pops out from the other side which would contain the information and contact details about a service selected from the map. Since the scripts to implement the map and pins have not yet been implemented, a visible checkbox was placed in the header to use as a placeholder trigger for it to pop out. The info box is split into three different ports, the title, the contact info, and the description with the intention that the title and contact info always remain visible and the description would be scrollable. The first attempt at coding this resulted in the description overflowing the viewport on some display sizes but was fixed by defining the max-height property. The resulting code snippet is shown in figure 9 and the UI is shown in figure 10.

![Text

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Figure code snippet for the style of parts of the info box

![Graphical user interface, text, application, chat or text message

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Figure UI with menu and info box open

# 3. Review and reflection

## 3.1 Ways of working

The initial plan had put a strong emphasis on eliciting and responding to user feedback, however based on tutor feedback the decision was taken to scale this back due to the time and complexity of collating and analysing all the data that would be produced. This proved to be a correct decision, as gathering feedback proved to be very challenging since while 8 people agree to take part, ultimately only 3 completed it. Unfortunately, the service providers that were contacted were among those who did not complete the questionnaire resulting in, with one withdrawing late on not leaving time to find a replacement. This highlights that relying on feedback too heavily for this project would leave it vulnerable to not receiving the quantity or quality of feedback required. The feedback that was elicited though, did provide some very useful suggestions and feedback, and although creating a full stakeholder & requirements matrix was ultimately not possible as originally planned, the feedback allowed a demonstration of how it would be constructed with a more extensive requirements elicitation process.

Based on tutor feedback, there was also a rearrangement of schedule to conduct skills development on CSS and then attempt to code the visual parts of the user interface, since this was a topic not previously covered on TM352. Tackling something more challenging early in the project is advantageous as it allows for time to correct any issues that arise and overcome unforeseen difficulties. This proved to be important as learning a new programming language can be time consuming and challenging to find the most relevant parts to the tasks to be undertaken.

During the initial stages of development, Microsoft OneDrive was used as a simple form of version control, to make it easier to keep everything updated when working on the project on different devices. This was done by saving separate folders for the project code noting the date, as shown in figure 11. The alternative of using GitHub was not felt necessary at that time, since the project has only a single developer and shouldn’t require much, if any, branching. However, after some several days, it started becoming difficult to keep track of which version was the most up to date as there were three places where the code was stored (PC, Laptop and OneDrive) that didn’t automatically sync up. Therefore, at this point GitHub was used instead, as it is much simpler to keep everything up to date on all devices and branching could be used to preserve specific development states, which might need to be referred to for reflection and analysis. Figure 12 shows the use of GitHub and some early commits.

Graphical user interface

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Figure Use of OneDrive

Graphical user interface, text, application

Description automatically generated

Figure Use of GitHub

Tutor feedback requested:

* How much more effort should I put into requirements?
* Do you have any suggested topics for the TMA03 literature review?
* Does the app as now proposed still go far enough beyond level 3 modules?
* Should I endeavour to add more complexity to the styling?
* I really struggled to stay in the word count, so any suggestions on where the fat can be trimmed would be helpful.

## 3.2 Evaluating project management

The project lifecycle was initially conceived as a ‘user centred lifecycle’ with ongoing feedback gathering, prototyping and iteration. However, as previously discussed feedback gathering and analysis was scaled back to be commensurate to the timescale of the project, so while prototyping is still planned once more development has occurred, a more continual feedback gathering regimen has been dropped since it may present a risk to the timely completion of the project. The focus instead to is to try to minimise the number of backward steps that may occur, while still ensuring that stakeholder feedback and iteration still take place. Additional work that could not be undertaken should be noted and discussed in a ‘future work’ section going forward.

## 3.3 LSEP and EDI

A requirement of the project involves following the BCS Code of Conduct (2023), which includes promoting equal access to IT (discussed below, when considering the impact to equality and accessibility) and not to disclose confidential information. Additionally, there are responsibilities to data protection under GDPR, so ICO (2023) guidance must be followed in relation to personal data. Therefore, in addition to gaining the proper informed consent of participants consideration had to be taken to protect the data and anonymity of participants. This included storage of completed questionnaires, with Microsoft OneDrive to be used as per Open University Research Data Management Policy (2021). The names of participants were to be redacted, as was any other statements or information that could be used to identify them so they could be quoted anonymously. The exception to this was any service providers who participated, since by noting them as a provider of a particular service they may be unavoidably identifiable, but they were informed of this and consent gained so that they could choose to opt-in or opt-out.

Although the application is being developed for a minority community, this does not necessarily mean it automatically meets responsibilities for Equality, Diversity, and Inclusion. Even within the transgender community there are many different experiences that are quite different, trans masculine, trans feminine and non-binary for example and these identities may intersect with other identities such as neurodivergence, race and disability. For transgender people, examining the nature of gender and how it exists in society is often part of the experience of transition and trans feminine people frequently experience what is known as transmisogyny (Julia Serano, 2007), the simultaneous experience of sexism and transphobia i.e. being dismissed as lesser or weak for being feminine, but also dangerous or ‘perverted’ at the same time. However, as a white, neurotypical, trans feminine person there are still unconscious biases that come with this that must be examined. It is also important to note that while the legal framework is important, it may be flawed with for example the Equality Act 2010 containing language considered outdated and offensive to the transgender community such as ‘gender reassignment and transsexual’, as noted by a report by the Women and Equalities Committee (Miller et al, 2015).

The questionnaire for requirements elicitation resulted in respondents discussing some of these issues, making suggestions for transmasculine, non-binary people and those who are neurodivergent, such as having service tags to filter content specifically for identities e.g. transmasculine people. This is not just for the convenience of the user, but also their mental wellbeing as some services that people transitioning from male to female might trigger gender incongruence in those transitioning from female to male, and in my own experience it is common in trans spaces to be aware of these issues.

However, beyond content the coding of the app must also consider accessibility issues, such as users that use screen readers, those with colour blindness and users that may be using a variety of devices or browsers. As Gray states in his CSS Tutorial – Full Course for Beginners (2022), if the font size is set to a specific pixel size, then it will stay at that size regardless of what settings the user might have. This may cause issues particularly for partially sighted users, but also for any user who simply prefers to have larger font. Instead using a ‘rem’ unit will mean that the font size is relative to the root element and will scale accordingly. Additionally, setting fallback fonts improves accessibility by ensuring the text will always be displayed with a ‘web safe’ font.

It was also important to consider how it would be read by a screen reader and with particular care taken when using a property such as ‘display:none’, which not only hides an element from view but also from being read by a screen reader. The pop-in side menu is triggered by toggling a checkbox (by pressing the hamburger menu symbol) and initially this was hidden from view by using ‘display:none’, which made it un-selectable by tabbing through elements. To change this, a style was added to the checkbox so that when it is in focus, the hamburger icon changes background colour as it does when hovered over and the checkbox was then hidden by setting the opacity to 0. The code snippet in figure 13 shows this change.

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Figure Removal of display:none for screen readers

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# 5. Appendix A: Questionnaire

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Figure Questionnaire pg1

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Figure Questionnaire pg2

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Figure Questionnaire pg3

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Figure Questionnaire pg4