School of English, Media & Theatre Studies

NUI MAYNOOTH
Ollscoil na hÉireann Má Nuad

Centre for Media Studies

Essay Cover Sheet

Please attach to the front of your Essay.

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Module Code & Title: MD217 – HUMAN COMPUTER INTERACTION

I confirm that the attached media essay is entirely my own work and that I have read and understand the Department's Policy Statement on Plagiarism.

Signed: *Leila Benhariz* ....

Date: 08/12/2020 ....

Essays must be handed into the School's Office by 5.00 p.m. on day of deadline.

Late submissions will have marks deducted from final module result.

Essays late on medical ground: attach original medical cert to essay.

Introduction:

For the purpose of this assignment we chose to build an Ambulance Station Storeroom Database Management app which allows members of the paramedic service to view the availability of drugs and medications in the storeroom of their assigned Ambulance Station, and can be used as a log system to monitor the depositing and withdrawing of drugs from the storeroom. We chose to create this app simply because one does not already exist, we felt that it would be necessary for this type of application to be available to the ambulance and paramedic service in order for paramedics to move more efficiently without wasting time searching the storeroom for various drugs on arrival, they could simply just check the app on the way to the station and know the availability of each drug in advance.

Background Research and Overview of Apps Key Features and Functionalities:

In order to do research to inform the development of our application we spoke to a member of the paramedic service to determine what functionality would be necessary and unnecessary to implement in order for the app to be most effective for paramedic use. From this conversation we developed a list of key criteria to include in the app design:

- A simple, minimalist design which allows the app to be easily navigated
- A withdrawal function for accessing medication
- A restock function to allow for stock quantity to be replenished
- A function to view the contents of the storeroom to check availability of drugs
- Access to the Paramedic Handbooks

The simplistic and minimalistic design was necessary as paramedics would not have time to navigate through complex applications, the interface needs to be straightforward and clear to allow for quick and easy access. The withdrawal function should be easily accessible and be used to aid in the logging of withdrawals from the storeroom. It should allow the user to indicate the quantity and dosage (in milligrams) which they want to withdraw and use a built-in QR scanner to register the drug. Alternatively, the user will be able to input the serial number of the drug in the event that the QR code is damaged. The restock function will work similarly to the withdraw function in that the user will indicate the quantity and dosage (in milligrams) that is being stocked, and will use the QR code or serial number of the drug to scan it into the system. However, only certain paramedics and managers have the clearance necessary to restock the storeroom, so only these users will have access to this function. If the user does not have the clearance to restock, a small red lock icon will appear over the button on the home page which links to the restock function. The function to access the storeroom to view all of the available drugs in the storeroom and their quantities will work in such a way that the availability of each drug will be indicated with a traffic light colour coded system. A drug which is fully stocked will be indicated with a green dot, a drug which is running low in stock will be indicated with a yellow dot, and a drug which is out of stock will be indicated with a red dot. Along with this, user will also be able

to view exactly how many of units of the drug are available in the storeroom. The paramedics will also have access to paramedic handbooks which will be pdf versions of the handbooks built into the app rather than being a link to the handbooks online.

For further research, we viewed an app that was previously created to carry out similar functionality as our app, however the implementation of this app did not meet HSE standards and so the app was retired from use. We performed some Heuristic Evaluations on the app using Nielsen's Ten Usability Heuristics for User Interface Design (Nielsen, 2020) to determine what was good and bad practise in order to inform our own app design and functionality.

| Problem Description	Heuristics Violated (H1	Severity (1-5)	Proposed Solution
Does not ask users for confirmation before completing an action such as withdraw	H5, H9	5	Provide an alert to ask user if they are sure they want to withdraw the selected quantity before contiuning
Interface was too complicated to navigate for paramedics with limited time to spare	H8	5	Provide as few links to different pages as possible to limit complication
Paramedic handbooks are links to webites rather than built into app, unable to zoom in to read, no function to skip ahead to certain pages	H7	4	Have handbooks built into app and be mobile friendly with the ability to skip to specific chapters

Figure 1: Alternate app Heuristic Evaluation

As well as the problems mentioned in the above table, the QR scanner did not function correctly and so drugs could not be scanned in correctly. We used this evaluation to inform our own app to ensure we did not make the same mistakes.

<u>Run-Through of an Envisioned User Interaction:</u>

From our research and requirements gathering, we determined that we needed a simplistic design which isn't fussy and only includes necessary components. We designed two low fidelity prototypes using Balsamiq Wireframes in order to ascertain what would be the best design approach to implement to fulfil the requirements. We decided to move forward with the second prototype as it displayed a more

simplistic design and was much easier to navigate, while the first did not have a simple layout and had too many pages. Below is an overview of the envisioned user interface at lo-fi level.
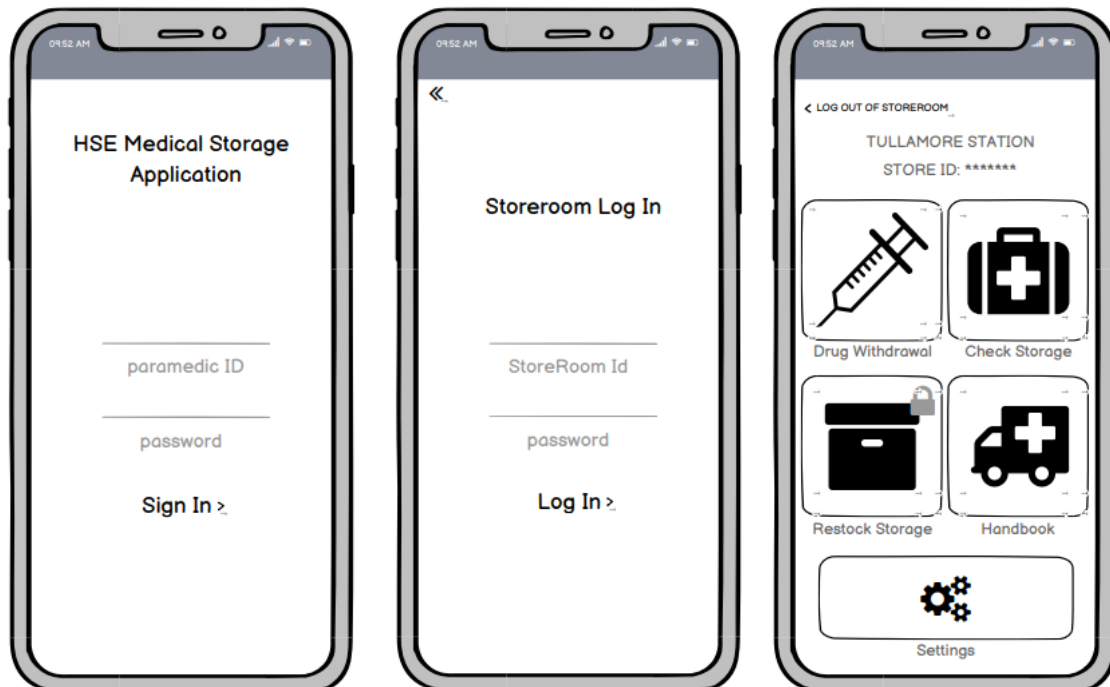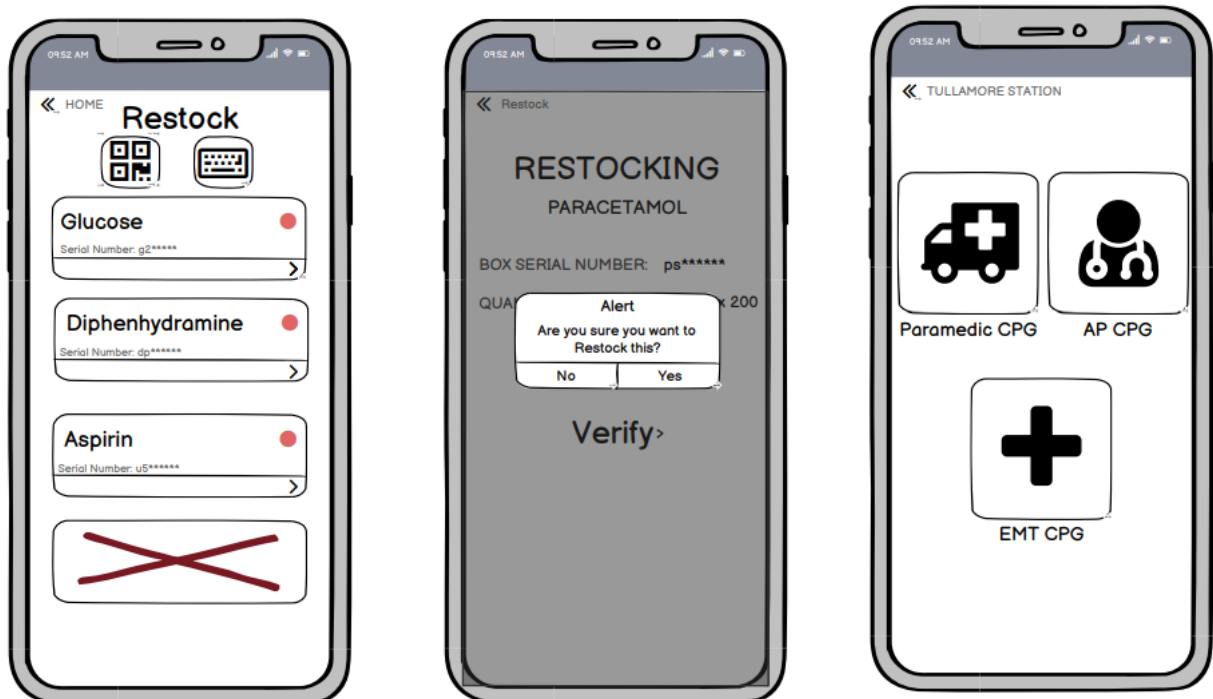

Pages 1-3: Login page, login to storeroom page, home page

Pages 4-6: Page to scan QR code or enter serial number to withdraw, Page to select quantity to withdraw, Error prevention message to confirm withdrawal
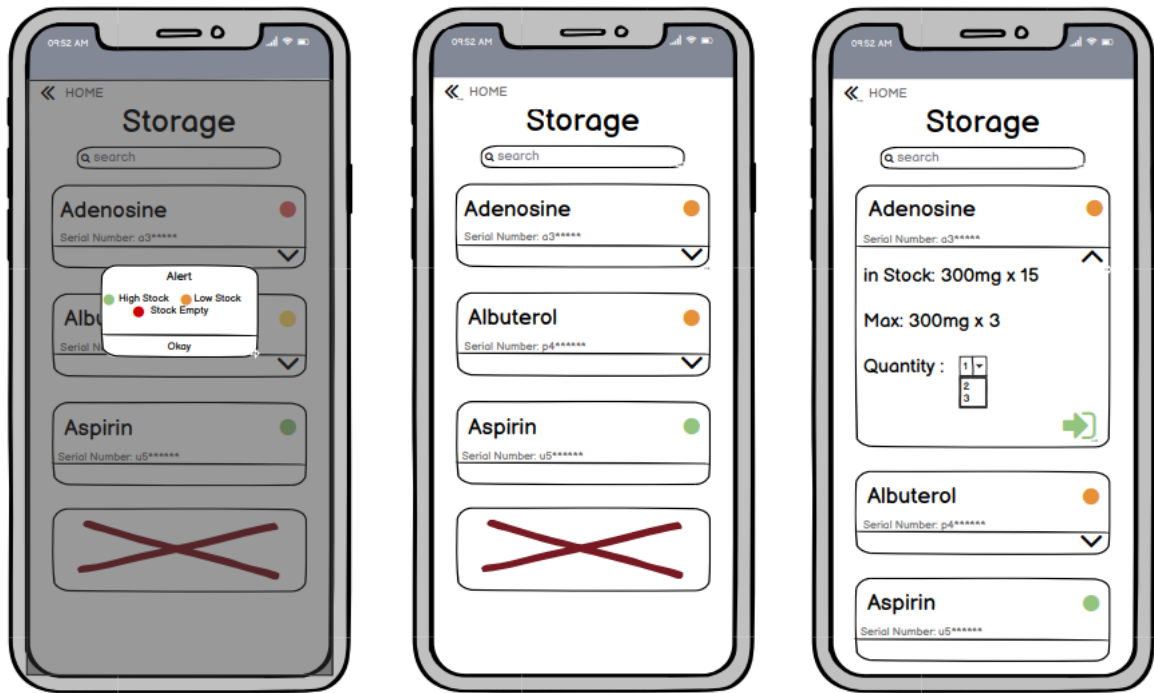
Pages 7-9: Alert to indicate the colour code system for drug availability, List of drugs, Dropdown menu to view quantity available
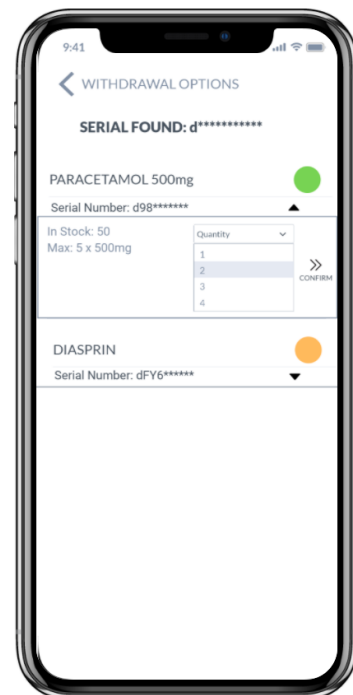

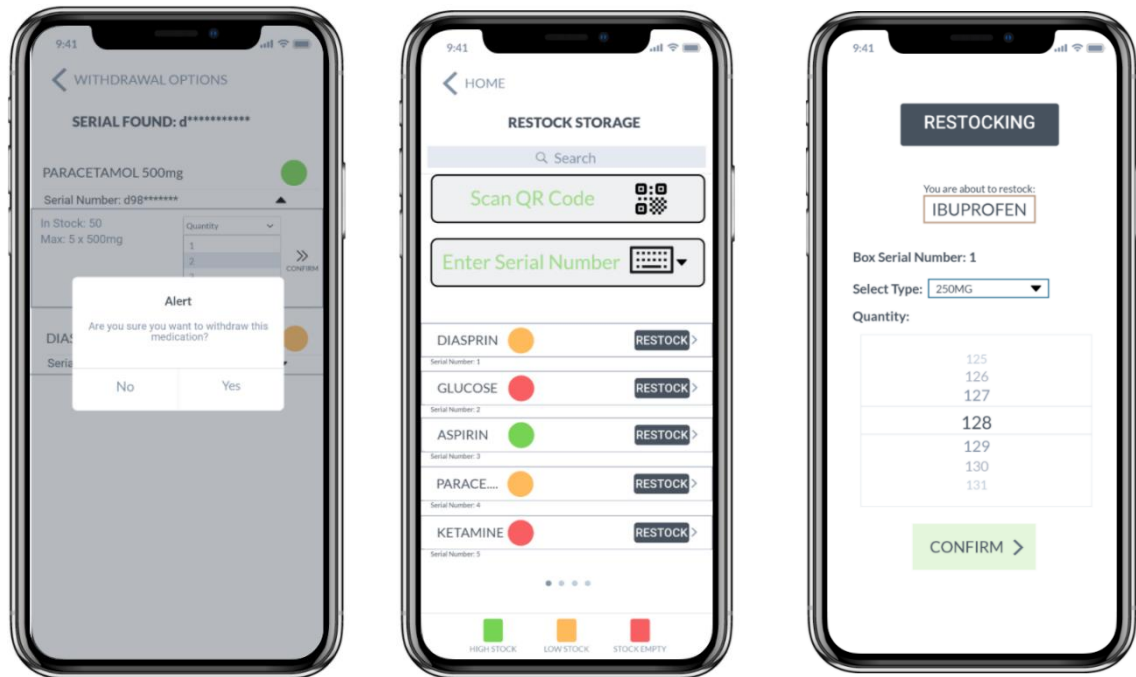*Pages 10-12: List of drugs for restock, Alert to confirm restock, Selection of Paramedic Handbooks*

From here, we designed a high fidelity prototype of our app using Marvel, altering some small aspects of the design to make it more efficient such as the layout of the list of drugs in the storeroom access function. Below is an overview of the envisioned user interface at hi-fi level.
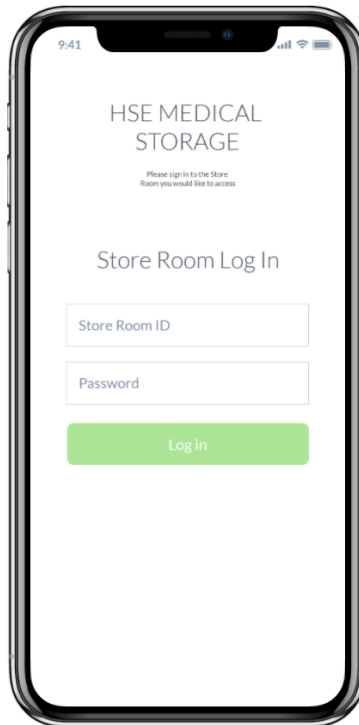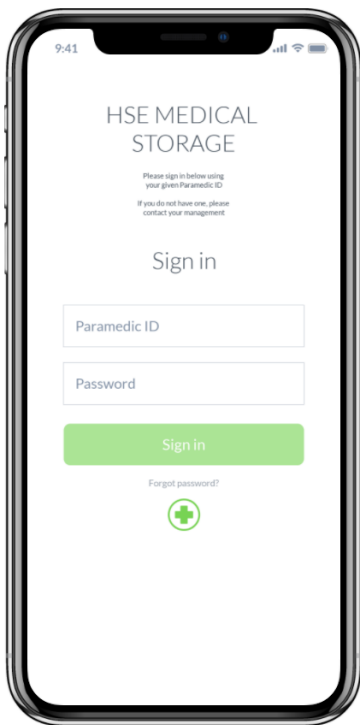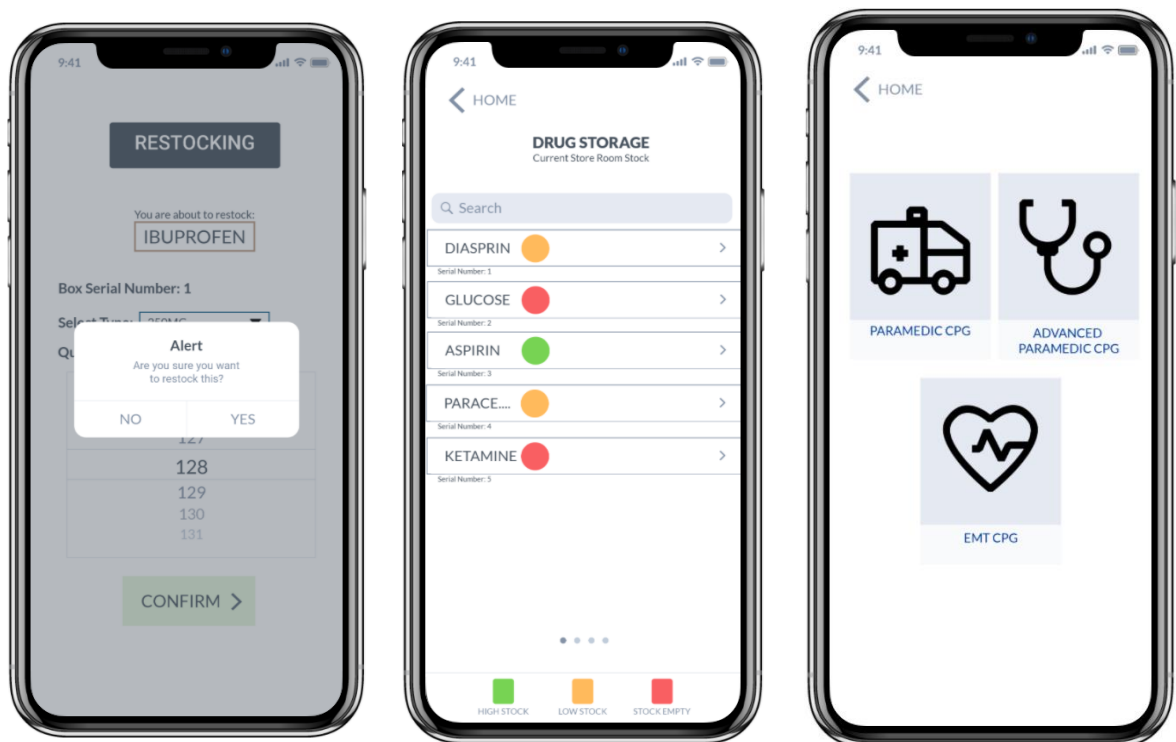
Pages 1-3: Login, Storeroom Login, Home Page

Pages 4-6: Options to scan QR or enter serial no. to withdraw, QR scanner, Select quantity to withdraw

Pages 7-9: Alert to confirm withdrawal, List of drugs to be restocked, Select quantity and dosage of drug to restock

Pages 10-12: Alert to confirm restock, Storeroom list with colour code system, Paramedic Handbooks

To run through the main functionality of the app; the paramedic will sign in using their unique employee ID number and a password, from there they will sign into the ambulance station storeroom to which

they are assigned using the storeroom's unique ID number and password. The user is then brought to the home page where they can choose to view the contents of the storeroom to check availability of drugs, use the withdraw function which works as a log system for checking out drugs from the storeroom using either a QR code or serial number of the drug, restock the storeroom (only if they have clearance to do so) using either a QR code or serial number of the drug, or read the Paramedic Handbook.

Feasibility Discussion and Justification:

The feasibility of our application was something we heavily considered upon developing ideas for our application. The simplicity of the app meant that actual implementation in theory was very conceivable, but the actual implementation of our app wasn't the only concern with the development of the application.

This application wouldn't require overly complicated development tools to create. The application itself could easily be developed on React Native as an iOS and Android application. The app would be required to run as a mobile application as many paramedics would be under too much of a time crunch to have the time to pull up a web application, and so this process makes it easier for them to work with. React Native could work with a UI library such as NativeBase which would allow us to create a simple interface for the user. The app also has a large database backend, as not only does the number of drugs have to be accounted for but also this branches out as we need to have an individual input for each stockroom. There are at least one hundred ambulance stations in Ireland and each station has at least one, if not two, different stockrooms. This would require a database management system such as MySQL, PostgreSQL or even MongoDB to ensure that the different aspects of the stock rooms are handled separately and accessed easily to allow us to alter and change them.

This implementation would likely be incredibly simple in terms of UI work, mainly due to the fact the application has an extremely simplistic design. The backend and maintenance of the backend databases would require more work, and so funding is very likely to be required to ensure that the application remains working in years to come. The biggest hurdle with the application is really the updating and management of the app. The CPGs (Clinical Practician Guidelines) are handbooks that are available in PDF form online for Paramedics to view and are updated every four years to reflect new methods that are practiced in the Emergency Medical workplace. This would mean the app would also have to be updated if it held the CPGs in the application, which is a functionality we added in. This is also the case for Medication in the Ambulance force. New medication isn't often introduced but can be introduced from time to time, and so this would need to be dynamically changed in the stock rooms accessory. Medication can also be discontinued from us, which would also need to be reflected in the application. Overall, with all these functionalities, it is clear funding from the HSE or The National Ambulance Service would be required. Not only would it be required in the actual implementation of all of these features, but also for the upkeep of the application, and to ensure that Paramedics get the best use out

of it as possible. It is a feasible app to develop, but simply would require a lot of feedback from paramedics who use it daily to ensure it is providing the best service that is possible to give.

We conducted a heuristic evaluation using Nielsen's 10 Usability Heuristics to test the feasibility of our app:

#	Heuristic	Notes
1	Visibility of system status	-App gives feedback to users in the form of window alerts to notify them that their actions are completed and accounted for.
2	Match between the system and the real world	-The language used within the app is readable English that paramedics would use and understand every day. -By following real world conventions, the app is accessible to all.
3	User control and freedom	-Certain users have access to stock maintenance (access to refilling stock) -All users with valid passwords to both paramedic ID and storeroom ID can remove medications from the storeroom
4	Consistency and adherence to standards	-Application remains consistent with ease of page flow throughout the application. -The application does not deviate from its own design and remains simplistic throughout its functionalities
5	Error prevention	-App provides an alert for user to confirm the withdraw/restock
6	Recognition rather than recall	-Layout of pages are similar, all exit buttons are in the same place on each page, withdraw and restock pages have similar layout for ease of use.
7	Flexibility and efficiency of use	-App implements an easy page to page access, with no complex functionalities -All buttons are easily accessed with easy-to-read icons for ease of use
8	Aesthetic and minimalistic design	-App is very simplistic design to ensure ease of use

9	Recognition, diagnosis, and recovery from errors	-App allows users to cancel withdrawals/restock before confirming -App provides a back button on every page in case the user selected the wrong page
10	Help and documentation	-Every page it clearly titled with a clearly located exit buttons. -The apps minimalistic design and clearly marked page links allows gives clear instruction for use.

As we can see from the above table, our app meets each outlined heuristic which indicates that our app would be feasible if our app was fully developed.

Team Roles and Individual Roles:

Team roles were vital to make clear at the beginning of our application development. It was clear that the app wouldn't need to be fully functional which did allow us to branch out a bit in terms of ideas, but we were very sure to also ensure the app was feasible and most of all, usable.

Our first course of action as a team was to come up with an idea based off of the template our lecturer had given us. Each of us presented issues we had come up with in previous lectures and labs, but found none of our issues to be unique enough to come up with a good idea for. One team member then suggested the Ambulance Station Storeroom Database Management app. The issue originated as the member of the team had asked a family member in the Ambulance service if they had any issues they would like to be solved, to which this idea was suggested. We came up with some basic solutions and found this idea to be the most ideal for our group.

The next task was to come up with a basic idea of how the application would look, and how best it could be implemented, whilst also staying on top of reports and presentations we would have to present at the end of the semester. The roles were distributed as so:

- *Lo-Fi Application: Niamh and Ciara*
- *Hi-Fi Application: Leila*
- *Presentation slide prep: Niamh*
- *Report Work: Niamh, Ciara and Leila*

Two lo fi applications were developed on Balsamiq Wireframes as we wanted to take two aspects on how this app could look. One was then chosen and given to Leila for Hi-Fi development using the Marvel online developer. This worked well for us as a group and we found we got work done quickly as a team thanks to laying out the roles very clearly to each other.

Final Group Reflection:

The application we ended up developing evolved quite a bit from our initial idea. Our design and ideas for the original application ended up evolving and changing. We formatted the application as a mobile application despite original ideas of it being a web site, as it was evident that desktop computers are much more ideal for lengthy content and complex interactions, where Mobile interactions are much simpler and more focused (Mobile user research methods, 2020). This was much more ideal for our focused group of users, allowing them to access their application quickly and easily.

Despite this change, our application remained relatively on course with the path we set out. We did add in the CPG access as an added feature to the application, but besides this we didn't alter the original idea considerably. The application was to be catered for Paramedics and so certain measures such as simplicity and ease of use were heavily considered, meaning that certain more complex designs of UI had to reassessed. We were overall happy with the design of our application and felt it met our wants as a group. Our test users were equally as satisfied with the project, with most of our feedback being overall positive. The application seems to have a lot of potential in the area we catered it for, giving us the confidence going forwards for other projects to attempt to work on ideas we may not have considered before.

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