# Background, Analysis & Process

## Project Overview

The NHS owns a database containing monographs for injectable medicines; each monograph contains useful information such as method of administration, preparation of the drug and flushing guidelines. As well as monographs for each medicine the database also contains values needed for calculating dosage and infusion rate for the medicines.

NHS Wales requested Aberystwyth University via the Software Alliance Wales scheme to provided them with a mobile application, to utilise this data to aid their staff in administering injectable medicines. The NHS provided access to the database via multiple XML API URLs.

The aim of this project was to fulfil that request by creating a well designed, functioning and thoroughly tested Android mobile application. The completed application had to query the data to allow user to quickly and efficiently find monographs. Upon finding the wanted monograph the application has to neatly present the monograph to the user. As some medicines also contain data on calculating dosage and infusion rates, the application had to utilise that data and allow the user to enter patient information (weight and needed concentration) to calculate dosage or infusion rate for that patient.

An Internet connection may not be available in all areas of a hospital, to allow the application to be used whenever needed, the application has to be built for offline use, to achieve this a complete copy of the database has be stored on the users device, thus allowing them to utilise the data when no Internet connection is available.

As to improve the maintainability and customisability of the system the NHS also requested that the structure of the data to be outlined within XML files, thus allowing them to create multiple applications for a variety datasets using the same application code.

As the application will be used to administer potentially lethal drugs, testing had to be executed thoroughly. Therefore a major part of this project was testing the finished application, ensuring that only the correct and most accurate information is displayed to the user.

## Background

Within this section I will outline the all background research I made before starting this project. This will include a list of the available technologies I could have used and an overview of what technologies already exists that complete similar goals to this project.

## Medusa website

The Medusa website is the site that NHS staff currently use to view and print monographs for injectable medicines. The website requests the member of staff to login using their NHS credentials, upon logging in a user is able to select a drug from a drop down list (suggestive search is not available). Once a drug has been selected the user is displayed with the monograph for the selected drug. If calculator information is available then a button to open the calculator is also displayed.

The Medusa website does not work on the mobile devices that I tested it on (the login functionality fails) and the site is not optimized for the screen size of most mobile devices. As the Medusa website does not work effectively on mobile devices the only method of accessing the monographs in a portable manner is to print the monographs, this not an optimal solution as the printed information may also become outdated and the user will not know; this method is also not environmentally friendly.

Using the Medusa website allowed me to see how a monograph should be displayed to the user. It also allowed me to see the shortfalls and drawbacks of the current system, such as the lack of a suggestive search functionality, which allowed me to change the projects requirements to provide a solution to these issues.

## Platforms and frameworks

Due to the time constraints of this project, one of the major decisions for the project was which framework or platform should be used to allow the application to be compatible for the largest amount of users.

A solution that would have allowed the application to run on the majority of devices would have been to create a web application. A web application is essentially a website that has been optimized for a mobile device. The major issue with a web application was that there is no way to store data on the device persistently therefore a network connection would have been needed. As the application has to work in offline mode, a web application was not a possible solution.

Phonegap is a mobile development framework that allows developers to write mobile applications using HTML5, JavaScript and CSS3 instead of device specific languages. Phonegap then compiles the application written using web technologies into a hybrid application for multiple devices. A hybrid application is an application that appears to be a native application to the user but is not a native application as instead of using the devices UI framework the application uses web views to display information to the user. The framework also gives developers access to the devices local storage and sensors, thus allowing developers to create web applications with similar powers to native applications.

Phonegap would have been an excellent framework to use for this project, as it would have allowed me to create applications to be used on multiple devices, using languages I was very familiar with. The main issue with Phonegap is that it does not allow you to run processes in the background; therefore the process of downloading and updating the local database would need to run in foreground, which is not an ideal solution as the process takes several minutes and the user is likely to move out of the application while the download is in progress. Another issue with Phonegap is that as the application does not utilize the devices UI frameworks the application may lack the look and feel of a native application, meaning it may be harder for a user to use the application.

Native Android and iOS applications would have been suitable for the project; they both have the ability to download the data over HTTP, parse the XML files, execute tasks in the background and save data for offline use within local databases.

Applications for iOS devices are created in Xcode IDE and are written in Objective-C, which is an object-orientated language based on C and C++. I have some experience in C and C++ but no experience in Objective-C or iOS development. I also do not own an iOS device therefore testing would have been primarily executed within an emulator.

Android applications are written in Java which is an object-orientated language using either Eclipse or Android Studio IDE’s. I have had a large amount of experiencing writing applications in Java, but had no experience in Android development. I also have two Android devices, which would allow me to test the application on a live device rather than an emulator.

Android currently has the largest percentage of market share, having 78% of the market share in 2013 [1]. Therefore developing the application as a native Android application will allow the application to be used by the most users. Due to this statistic and that I own Android devices resulted in me choosing to develop the application as a native Android application.