

1. Background

Counties Manukau Health (CMH) is the second largest District Health Board (CMDHB) in New Zealand and operates Middlemore Hospital. The demand on their services and systems has increased considerably due to a growing regional population. The hospital is large, spread over a wide area, and is stressful and confusing to navigate around. Currently, there are 4 options available to assist with navigation:

1. Staff will direct or guide patients and visitors to their service or destination if they request assistance.
2. Wall-mounted directories, with color-coded locations and services, are displayed in key areas of the hospital.
3. The themed 'Rainbow Corridor' is painted on the walls of the hospital's ground floor to reassure patients that they are on the right track to their destination.
4. A static external 3D image, of the hospital buildings and carparks, is available online, and as a printable pdf.

2. Rationale

This project was undertaken to deliver a web-based application for the following reasons:

1. Provide patients and visitors with a better orientated, informed and less stressful journey while at the hospital.
2. Provide an alternative digital method for delivering information to patients and visitors that is easily, and readily, accessible.
3. Reduce the number of staff who are being diverted from their jobs to provide directions and guidance.
4. The increase in operational costs to the hospital due to growing demand, and the inefficient use of staffing resources is increasing these costs.

3. Objective

The objective was to develop a web-based navigation application to enable patients and visitors to do the following:

1. Access basic information on key health services from any device (desktop, mobile, tablet) and on any platform (iOS, Android).
2. Allow patients and visitors to search for a location or service on a navigable map that will generate a pathway that they can follow directly to their destination.

4. Project Goals

The Project Team followed a methodical approach to meet the objectives and produce a functional proof-of-concept application:

1. Research vendors of suitable mapping software and conduct a preliminary evaluation.
2. Provide client with a recommendation for suitable software and that will meet the objectives.
3. Prepare hospital blueprints to develop the mapping features.
4. Design alternative interfaces for the application features and obtain client feedback.
5. Develop mapping and application features in short iterative cycles and obtain client feedback.
6. Test and obtain feedback from the end users (usability testing was conducted on family members).
7. Complete artefacts which support this project and hand over proof-of-concept product to client.

5. Methodology

Figure 1.0: How our methodology was selected?

Client's acceptance of the recommendation outlined in the Software Evaluation Report determined the hybrid approach. Hybrid approach consists of an Agile approach using Scrum Framework to drive development and a Commercial-Off-The-Shelf (COTS) approach for acquiring existing mapping software.

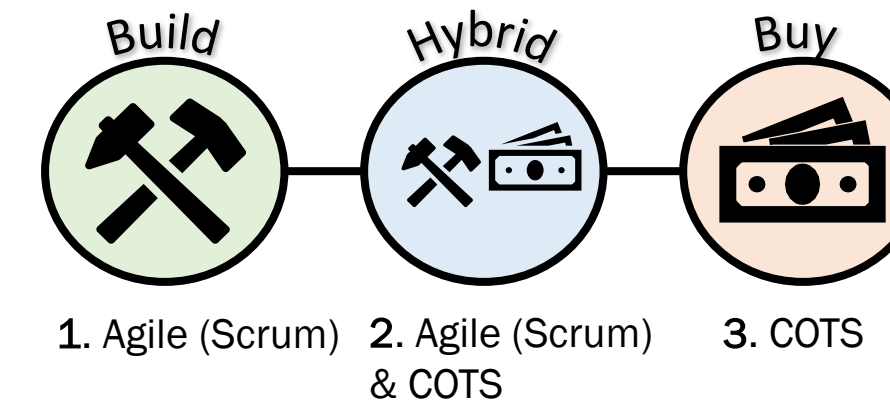


Figure 1.0 Build, Hybrid, and Buy Methods

Key artifacts were created, executed and monitored to successfully deliver the project.

Project Management Processes:

- Scope statement
- Risk Register
- Issue Register
- Project Plan (Schedule)
- Quality Assurance Plan

Delivery of quality artefacts were dependant on an agile mindset and critical evaluation of whether an artefact added value to the project and key stakeholders.

Development Processes:

COTS: Identify and procure mapping software.

- Software Evaluation Report

Agile (Scrum Framework):

Development of application which map is integrated into.

- Product Backlog
- User Stories
- Sprint Burndown Chart
- Sprint Retrospective

6. Project Artefacts

Figure 2.0:

Illustrates how the development tools we chose interacted with our application and map. As a web-based application we designed the application – built with React.js, and the navigation map - built with Mapwize. AWS Amplify is a cloud hosting service, therefore, the web-app can operate on any any device with a browser. If the application updates on GitHub, AWS Amplify automatically rebuilds and redeploys the app.

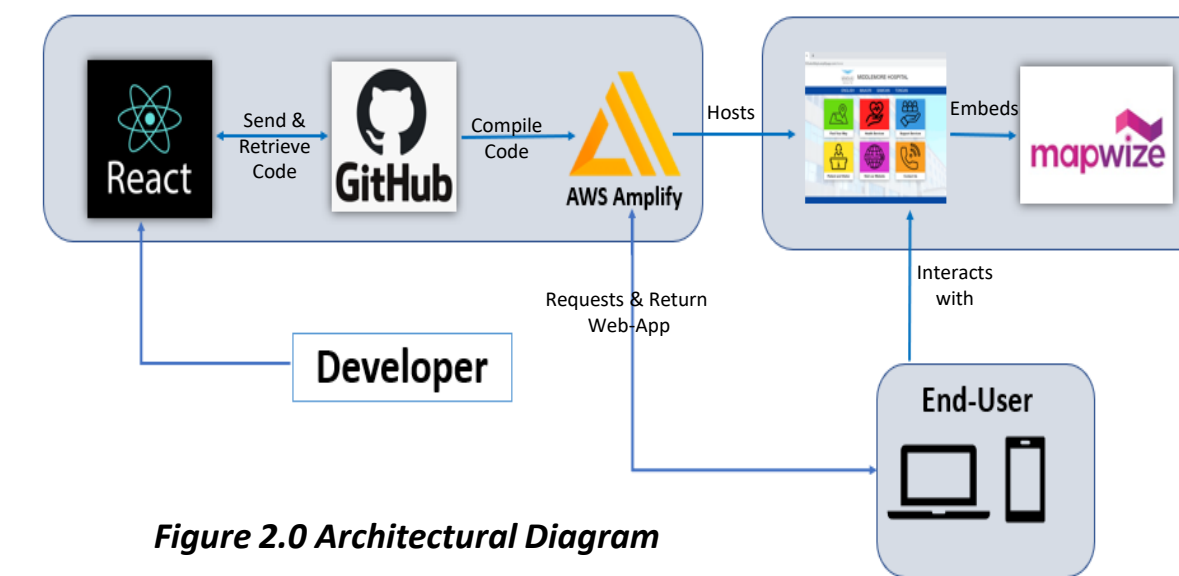


Figure 2.0 Architectural Diagram

Figure 2.1:

Visual elements that display the app on a desktop and mobile device. Written in JavaScript XML or JSX, allowing easy control and design over React components, using HTML and CSS. The map is embedded into our app via an iframe react component and allows searching for a location or service with directions and navigation through Middlemore Hospital.

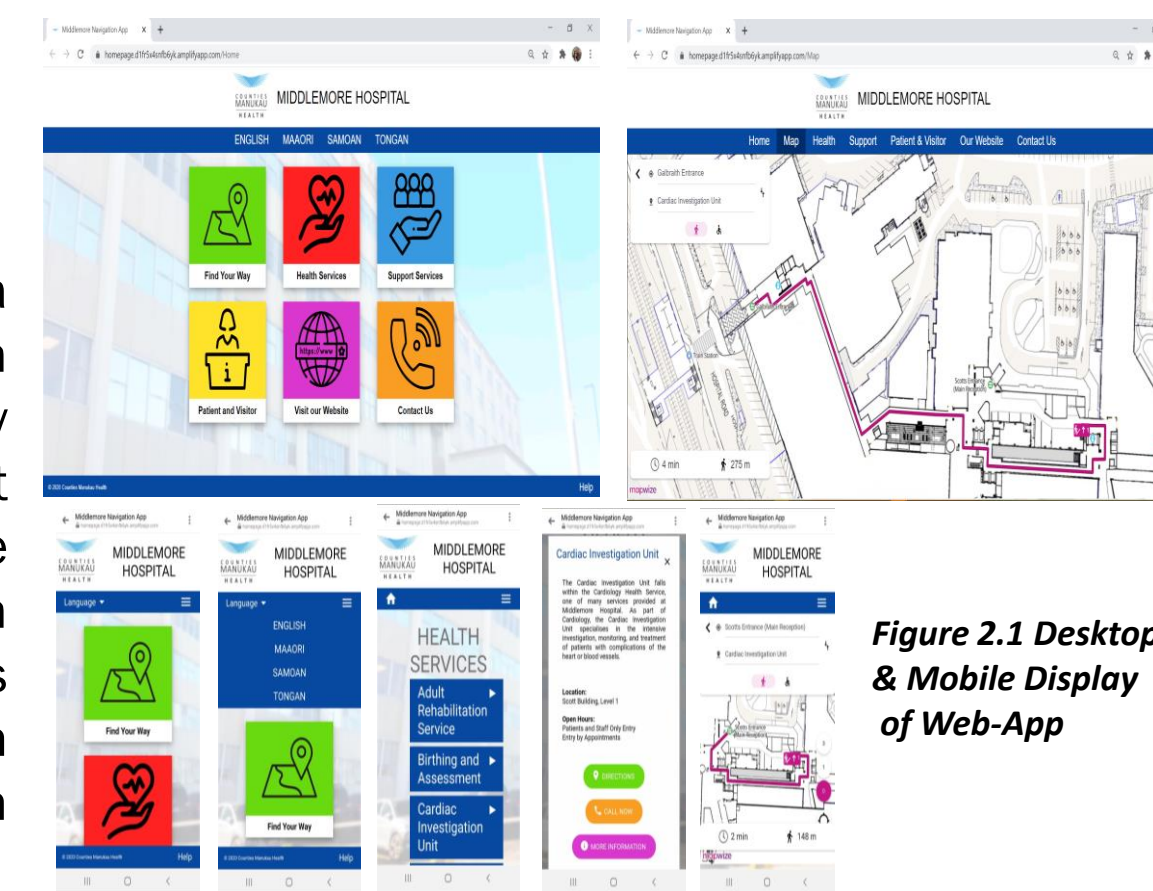


Figure 2.1 Desktop & Mobile Display of Web-App

Figure 2.2:

Scan the QR code with your mobile device and the application will open in your device's browser.

7. Challenges

Technical:

- Developing a functional navigation map using Mapwize. The challenge was learning how to use the software in a very short one-month time frame with only limited access to features and functionality.
- Integrating the mapping function within the application. The team were able to embed the map into the application using an iFrame.

Non-Technical:

- Determining an appropriate project methodology to decide whether we would build from scratch, buy existing software, or a hybrid combination of build and buy.
- Effectively managing the activities involved in a development project during a global pandemic. Face-to-face contact was severely restricted with the client and team, AUT campus was shut down, delaying development and access to the Research & Development Lab.

Lessons Learned:

- The importance of a whole-of-team effort for brainstorming sessions to develop creative solutions for our challenges that were simple and effective.
- The importance of establishing a good working relationship with all key stakeholders for getting information and feedback.

8. Highlights

- Collaboration with the International Sales Manager of Mapwize, an international software vendor based in France.
- Maaori and Pacifica languages (Samoan & Tongan) incorporated into the Home Page and Navigation Bar of the application and translated by our Maaori and Pacifica team members.
- Client feedback:
 - “ability to think about the bigger picture when it came to incorporating ideas into their app”
 - “.. went above and beyond the scope of the project”
- Our Project Team as we have cultivated and preserved a positive, supportive team culture throughout this year, over and above the challenges we have faced. It has been based on our team's shared values of open communication, commitment, professionalism, respect and trust.

9. Recommendations

Future development opportunities could include:

1. Purchase mapping software with the full functionality for an indoor map.
2. Implement wayfinding feature like blue dot tracking of user movement inside hospital.



Figure 2.2 QR Code

Acknowledgement

We would like to thank Counties Manukau Health, Megan Milmine, and AUT for the opportunity to be involved in the development of the Patient Navigation Application. We also acknowledge Dr Tony Clear and Dr Ramesh Lal, our AUT Supervisors, whose commitment and guidance enabled us to create a product to the absolute best of our ability that, we hope, exceeded their expectations. A special mention to the staff at Middlemore Hospital who supported our Project with their valuable time and professional advice.