Research & Design Portfolio

Michelle Adiwangsa

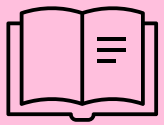
Hello~

I'm Michelle, a passionate user researcher with 6+ years of experience **gathering and defining user requirements, identifying research gaps, designing and conducting studies, and developing tailored solutions**.

I am currently completing my PhD in Human Computer Interaction at the Australian National University's School of Computing, where I investigate how exercising can be made more engaging and accessible using Augmented Reality technologies and game design principles.

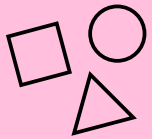
My Toolkit:

A selection of methods I utilise depending on project needs and constraints

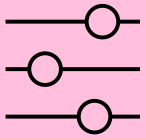


Background & Literature Review

Individual Interviews & Focus Groups



Co-design Workshops

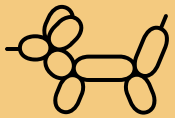


Surveys & Biometrics

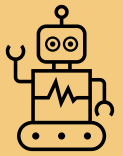
Role-playing & Personas

Storyboarding

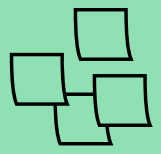
Ideation, Sketching, & Wireframing



Prototyping (Low & High Fidelity)

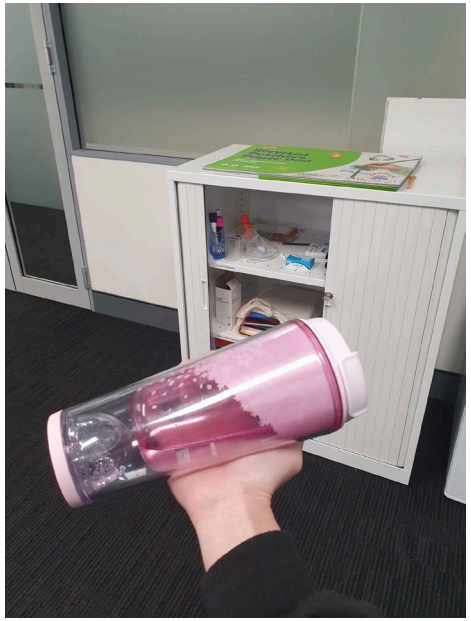


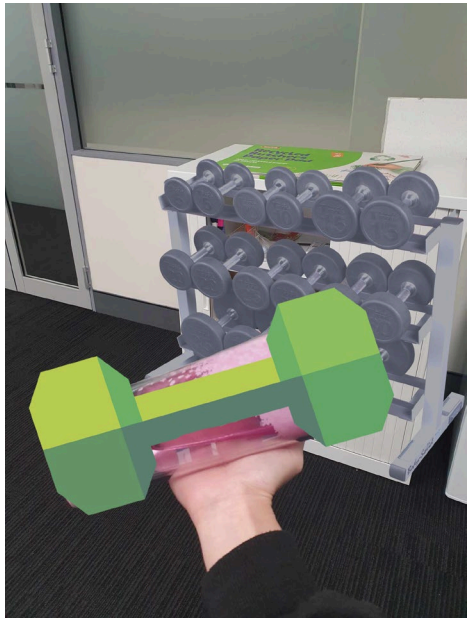
Pilot & User Studies/Testing



Qualitative Data Analysis, incl. Affinity Mapping & Thematic Analysis

Quantitative Data Analysis with Python's Machine Learning & Data Science Packages





Case Study 1:

Designing an Immersive Exergame to Promote Physical Activity at Home

Project Overview

Background

Exercising is important for staying healthy, but there are **many barriers preventing some people from exercising**.

Exercising at home, particularly using exercise video games (exergames) can overcome some of these barriers. However, **current exergaming systems are not always safe or inclusive and can be made more immersive**.

This is part of my personal PhD research project

Potential Solution

Augmented Reality (AR) Head-mounted Displays (HMDs) have the potential for facilitating more engaging, immersive, and inclusive exergaming experiences at home.

Gaps

There is a lack of research investigating how such systems can be appropriately designed.

Scope

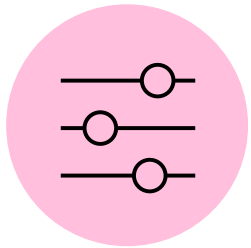
- Investigate home exercises that can appropriately be performed at home in AR environment
- Explore home objects that can be used to facilitate home exercises in AR, and how they can be augmented
- Develop design recommendations for other designers & researchers
- Design and develop a prototype on Microsoft HoloLens 2
- Conduct user studies to evaluate the prototype

Timeline, Risks, & Risks Mitigation Strategies

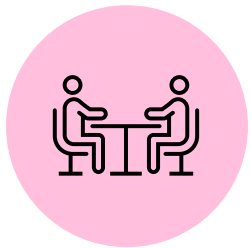
- Expected project timeline: July 2021 – January 2025
- As this project started during the COVID-19 pandemic and lockdowns, participant recruitment can be especially challenging. University students became the first group of target participants as they are more accessible.
- Potential delays have been considered (e.g., participant withdrawal & delays in ethics approval), and taken into account into the timeline.

Summary of Methods

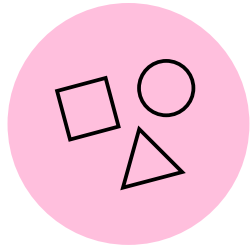
Background & Literature Review



Surveys



Individual Interviews & Focus Groups



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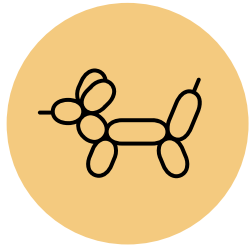
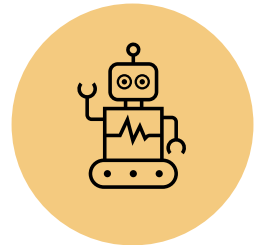
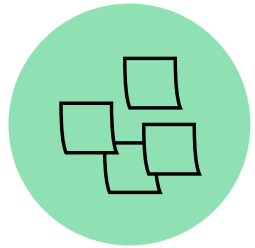


Prototyping



Pilot & User Studies/Testing



Qualitative Data Analysis

Details

- Employed **Participatory Design** method to gain insights how exergaming can be done at home in augmented reality
- Conducted **19 interviews** with the general population and physiotherapists, a codesign workshop with a multidisciplinary research group investigating Multiple Sclerosis, and **6 focus groups with 28 participants** involving photo-elicitation activity with Snapchat (for cultural probing)
- Collected and analysed **55 participants' demographic through Qualtrics survey**
- Analysed data qualitatively with **Affinity Mapping** and **Thematic Analysis**

Key Findings

- **Relevant insights** from multiple stakeholders (potential users, senior physiotherapists, and research partners investigating Multiple Sclerosis), **relating to suitable home exercises, suitable home objects, approaches to augmentation, additional motivational elements, and accessibility concerns**.

CATEGORY 1 – SUITABLE HOME EXERCISES

- Home-based exercises should mostly be stationary
- Home-based exercises should use minimal special equipment
- Home-based exercises should incorporate both structure and novelty
- Exercises need to be tailored to each person's evolving needs, abilities, and interests.

CATEGORY 2 – SUITABLE HOME OBJECTS

- Different home objects can be used for different exercises
- Home objects can be used as alternatives to exercising tools.

CATEGORY 3 – APPROACHES TO AUGMENTATION

- Preference for home object augmentation for exercising varies between individuals
- Augmenting the surrounding environment could enhance immersion

CATEGORY 4 – ADDITIONAL MOTIVATIONAL ELEMENTS

- Home-based exercising could benefit from motivational elements beyond augmentation.
- Social elements are important for exercising at home in an augmented environment.

CATEGORY 5 – ACCESSIBILITY CONCERNS

- There are accessibility concerns with the use of AR to exercise at home.

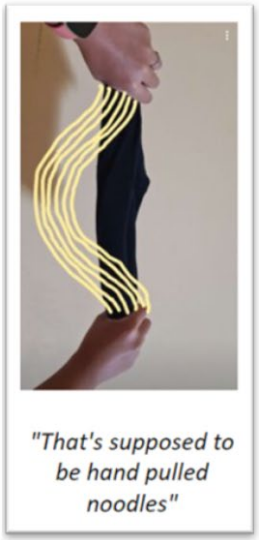
Key Findings

- **3 design factors** that designers and researchers should consider when augmenting home objects for exercising, derived from participants' augmentation ideas

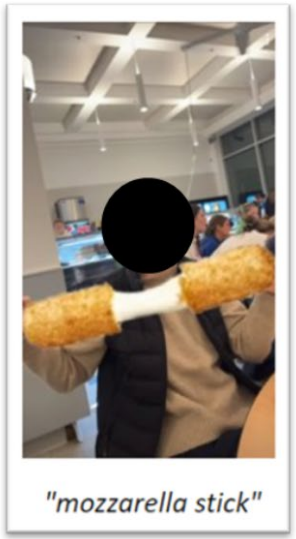
Food, nature, and objects with emotional attachments are common categories of personal motivation. However, take note of personal/cultural differences as some objects may be inappropriate.

Mapping of object properties and movement of the exercise should be considered for augmentations (e.g., stocking & elasticity). However, take note of different cultural differences when it comes to understanding of object mapping.

Augmentations should include physically meaningful and engaging interactions. Suggestions include adding a virtual object to balance, a virtual trajectory to follow, a tracker for the exercise, and dynamic changes to the augmentation.



"That's supposed to be hand pulled noodles"



"mozzarella stick"

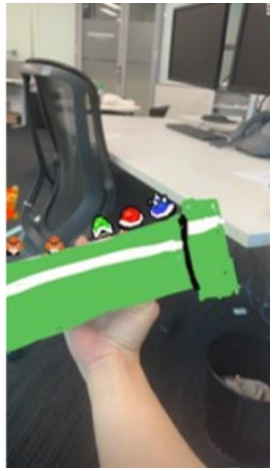
"Stretchy slime, like flubber"

examples of participants' augmentation ideas for upper-body resistance exercises using a stocking

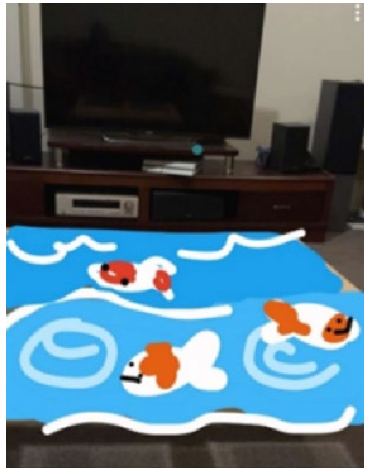
Key Outcomes

- A set of design recommendations for other designers and researchers aiming to develop exercising/exergaming experiences on AR HMDs, published in the #1 publication venue for Human Computer Interaction research (CHI'24)
- Design of 4 different home exercise programs in augmented reality (illustrations below by participants)

Weightlifting using a water bottle augmented as a pipe that needs to be balanced

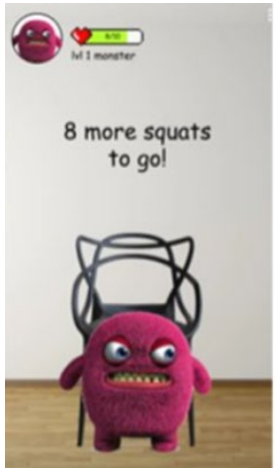


Push-ups on a table augmented as an interactive fishpond



Upper-body resistance exercises with a stocking augmented as a slime

Squats onto a chair, with a virtual monster in front of the user that needs to be attacked

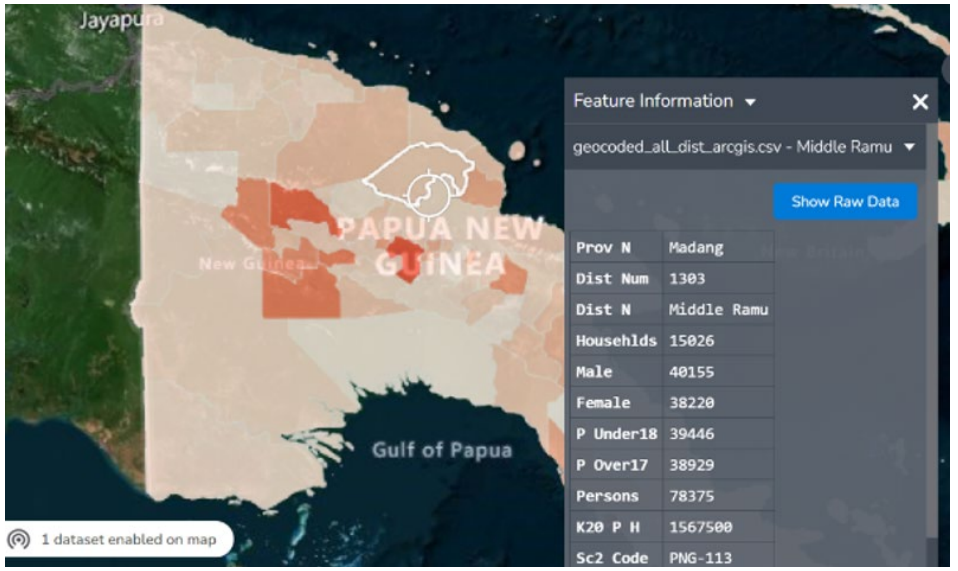


Learning Points

- AR HMDs can facilitate some home exercises by augmenting existing objects at home
- Not everything needs to be augmented to facilitate home exercises in an AR environment
- Cultural differences could affect how users would like home objects to be augmented
- Even though AR HMDs could facilitate more engaging and accessible home exercising, it is still not fully accessible for some groups of people who may need assistance using the device

Case Study 2:

Employing UX Design & Research Methods to Alleviate Issues in the Pacific Nations



Project Overview

- This project was funded by the Australian Government's Department of Foreign Affairs and Trade (DFAT), and in collaboration with The Pacific Community
- Multiple sub-projects were conducted at the same time to address different issues/shortcomings in the Pacific Nations.
- I worked in a small team of 4, consisting of the team leader/UX lead, a senior UX designer, an administration officer, and myself.

Sub-project 1

Visualising Papua New Guinea's National Health Data on PacificMap

Sub-project 2

Exploring and mapping opportunities for learning UX/other design disciplines and promoting gender equality in STEM in Pacific nations

Sub-project 3

Exploring potential solutions for combatting obesity in Pacific nations

Project Overview: 1

Background

Papua New Guinea's National Health Data Report is a comprehensive document containing various demographic statistics, used for key decision-making processes. These **statistics were presented in table formats, in PDFs**. This led to 2 problems:

- Decision-making may not be very effective when the **user can only rely on information in a tabular format (instead of visual representation)**
- Numerical values in table formats in PDFs are **not machine-readable** (at the time)

Potential Solution

PacificMap, a web interface for transforming .csv files into visual representations on an interactive map, could be employed.

Gaps

The statistics were not available in .csv format. PacificMap's design features were also not optimised for the National Health Data Report.

Project Overview: 2

Background

UX design is not a very commonly studied discipline in Pacific nations. For people in these nations with UX design training, there is **a lack of awareness related to how they could undergo further training in UX design**.

While conducting this project, we also noticed **gender disparity in STEM** among Pacific nations.

Potential Solution

Locations of institutions for learning UX design can be added to an interactive map to increase awareness. Introductory workshops to promote education in UX design and STEM can be conducted, especially for young girls.

Gaps

There is a lack of information relating to: (1) which institutions offer UX design as a course; and (2) how UX workshops can be designed for younger children.

Project Overview: 3

Background

WHO 2016 data estimated that **43% of adults in the Pacific Island Countries (PICs) are obese and overweight**, which is more than 3x the global average.

This project explores potential solutions to combatting this problem.

Potential Solution

Interactive technology has been used to promote behavioural change in a more engaging manner.

Gaps

Obesity is a sensitive issue, and little is known about people's technological preferences and requirements in the PICs.

Scope

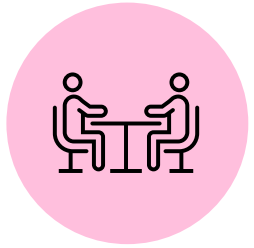
- Transform the National Health Data Report statistics into machine-readable .csv files
- Work with senior and lead UX designer to optimise PacificMap visual representations for the National Health Data Report
- Gain insights relating to which institutions offer UX design courses across all Pacific Island Countries, and how they conduct the courses
- Design an introductory UX workshop catered for young girls
- Explore engaging and appropriate solutions for promoting physical activity levels and healthier eating habits in Pacific nations

Timeline, Risks, & Risks Mitigation Strategies

- Expected project timeline: October 2019 – February 2020
- This project was conducted just before COVID-19 pandemic, when online meeting applications such as Zoom were not that commonly used. Many interviews had to be conducted via (international) traditional phone calls, which can be expensive. Phone call interviews were only conducted if necessary, and they has been taken into account for the project cost.

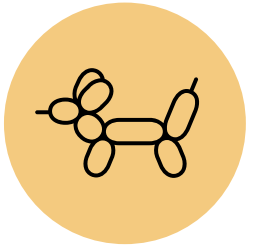
Summary of Methods

Background & Literature Review

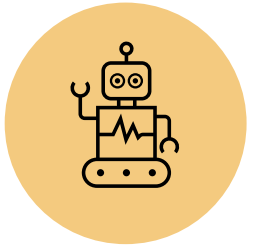


Individual Interviews

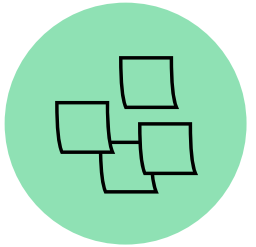
Ideation, Sketching, & Wireframing



Prototyping



Pilot & User Studies/Testing



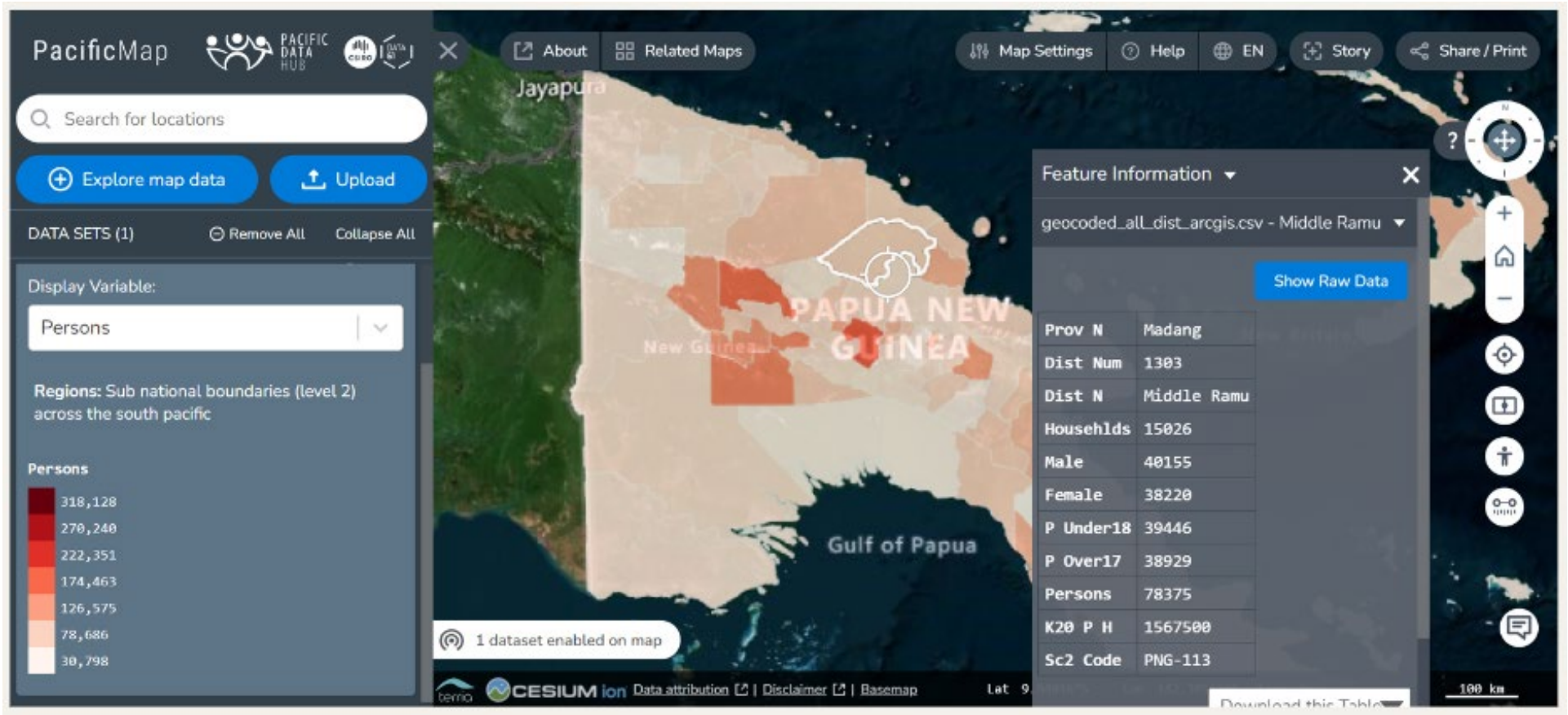
Qualitative Data Analysis

Details

- Performed library, internet, and literature searches, in addition to developing and conducting interviews with diverse stakeholders (see below) to gain insights for each project
  - Current/previous workshop facilitators in Vanuatu
  - Representatives from multiple institutions across Pacific Island Countries
  - Subject-matter experts specialising in relevant Pacific affairs
- Designed introductory workshop to promote UX design among young girls
- Performed data entry and cleaning to visualise the Papua New Guinea National Health Data Report on PacificMap
- Collaborated with senior and lead UX designers to iteratively optimise the design of a web interface

Key Findings

- **Project 1**
  - **Additional colour options** had to be added to the PacificMap to distinguish the differences between some statistics.
- **Project 2**
  - There was **a lack of institutions across Pacific nations that offered UX design** as a course. Some “UX design” courses that were offered by some institutions were actually more targeted towards web/UI design.
  - Some workshops have already been conducted in some Pacific Island Countries, but they are usually ‘one-off’ workshops and therefore the workshop participants usually **do not have opportunities to further their learning**.
- **Project 3**
  - We need to **be more subtle** when it comes promoting behavioural change to combat obesity, as it can be seen as offensive.
  - At the time, use of mobile phones was not as popular as television consumption. **Increasing awareness through television shows** could be a potential solution.



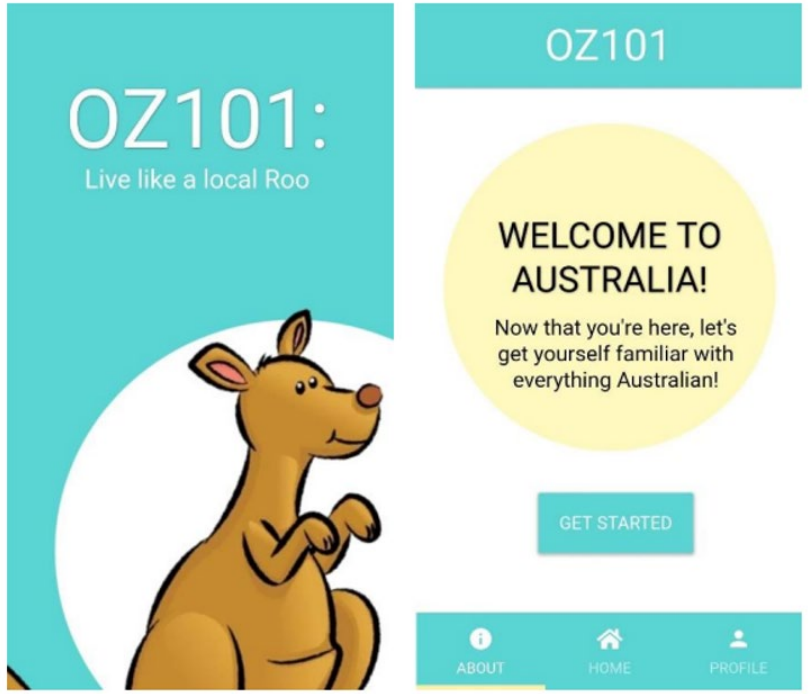
Screenshot of PacificMap with National Health Data Report in .csv file. Graphical visualisation on a map makes it easier and faster to make decisions, e.g., which district needs more attention regarding Malaria.

Learning Points

- Methods and solutions commonly used in one country (e.g., Australia) might not be suitable for other countries (e.g., Pacific Island Countries)
- Workshops should be delivered multiple times, consecutively as a series, and not just a ‘one-time’ session.
- We need to be more subtle in terms of our solutions when it comes to certain sensitive topics.

Case Study 3:

Designing a Mobile Interface System to Combat Loneliness and Isolation Among International Students in Australia



Project Overview

Background

In 2018, **Australia welcomes more than 6.5 million international students' enrolment** across different educational levels. In a new environment, international students can experience difficulties interacting with other people, which could lead to loneliness and isolation. **Loneliness is found to be most common among the 18 – 24-year-old age group**, commonly associated as the time period for undergoing higher educations.

This was part of my Honours year research project

Potential Solution

Interactive technologies could help increase the quality of relationships and quantity of social contacts.

Gaps

Most suggestions stop at more traditional methods (e.g. going outside more). There is a lack of focus on international students.

Scope

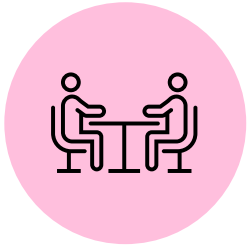
- Investigate in what ways can the use of interactive technology increase the quality of relationships (to ease loneliness)
- Investigate in what ways can the use of interactive technology increase the quantity of social contacts (to prevent social isolation)
- Develop a prototype for the identified solution and gain user feedback through testing

Timeline, Risks, & Risks Mitigation Strategies

- Expected project timeline: July 2018 – June 2019
- This project touches on the topic of loneliness and social isolation, which can be sensitive and/or distressing to some people. Human ethics approval have been obtained. Participants may stop and withdraw from the study at any time and were informed of various resources that could help them in case of mental distress.

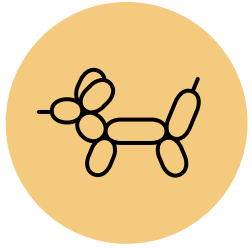
Summary of Methods

Background & Literature Review

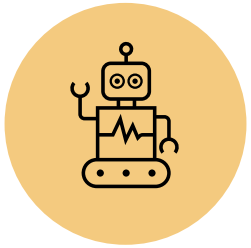


Individual Interviews & Focus Groups

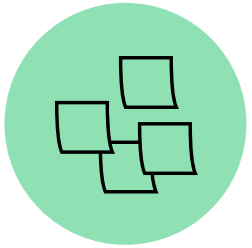
Role-playing & Personas



Prototyping



Pilot & User Studies/Testing



Qualitative Data Analysis

Details

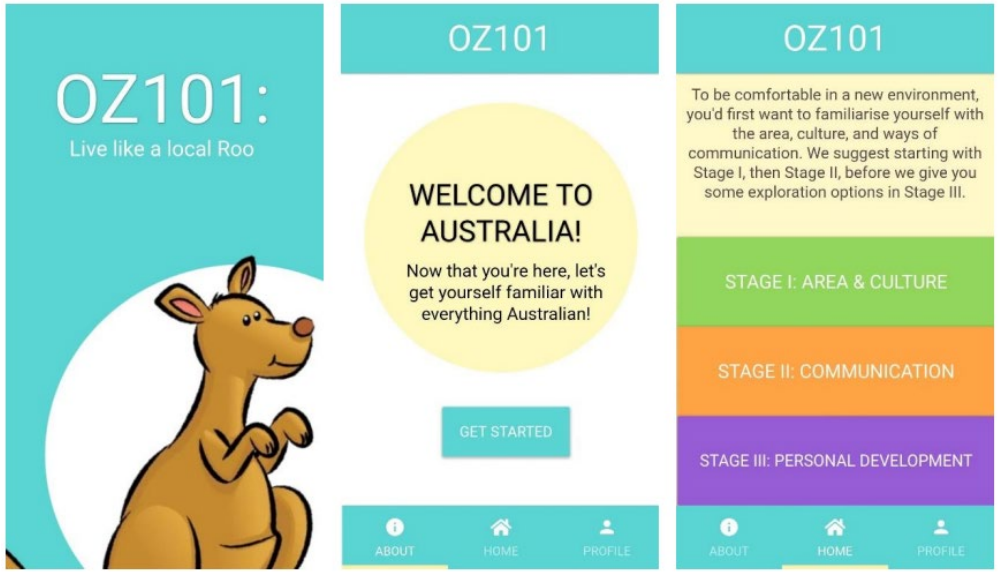
- Employed **Grounded Theory** approach to gain insights from both domestic and international university students on the root causes of loneliness and social isolation among international university students
- Conducted **11 interviews** that made use of **scenarios, personas, and role-playing**
- Conducted **3 focus groups involving 10 participants** that made use of **scenarios, personas, and role-playing** to gain feedback on current list of potential solutions
- Developed **a prototype for a mobile application** to help international university students familiarise themselves in the new environment
- Conducted **user studies** with 5 international students to test the mobile prototype

Key Findings

- **Lack of cultural competence was revealed to be an underlying issue** behind international students' loneliness and social isolation, as it may restrict the quality and quantity of social interaction.
- To develop cultural competence, this research suggests for international students to **familiarise themselves with the new area, culture, and ways of communication (in order)**.
- **Developing cultural competence is particularly critical during the first few weeks upon the international students' arrival**, as this would be the period when most students could interact and mingle with each other through university-organised events, especially during orientation week.
- **Simulation and hypothetical scenarios** involving cultural competence can be employed in interactive technology to help prevent loneliness and social isolation.

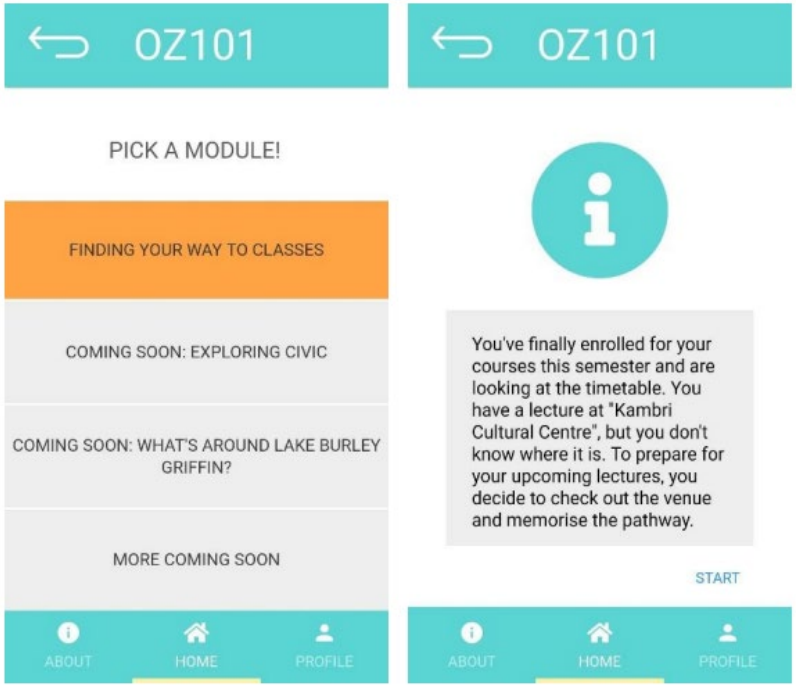
Details of Prototype

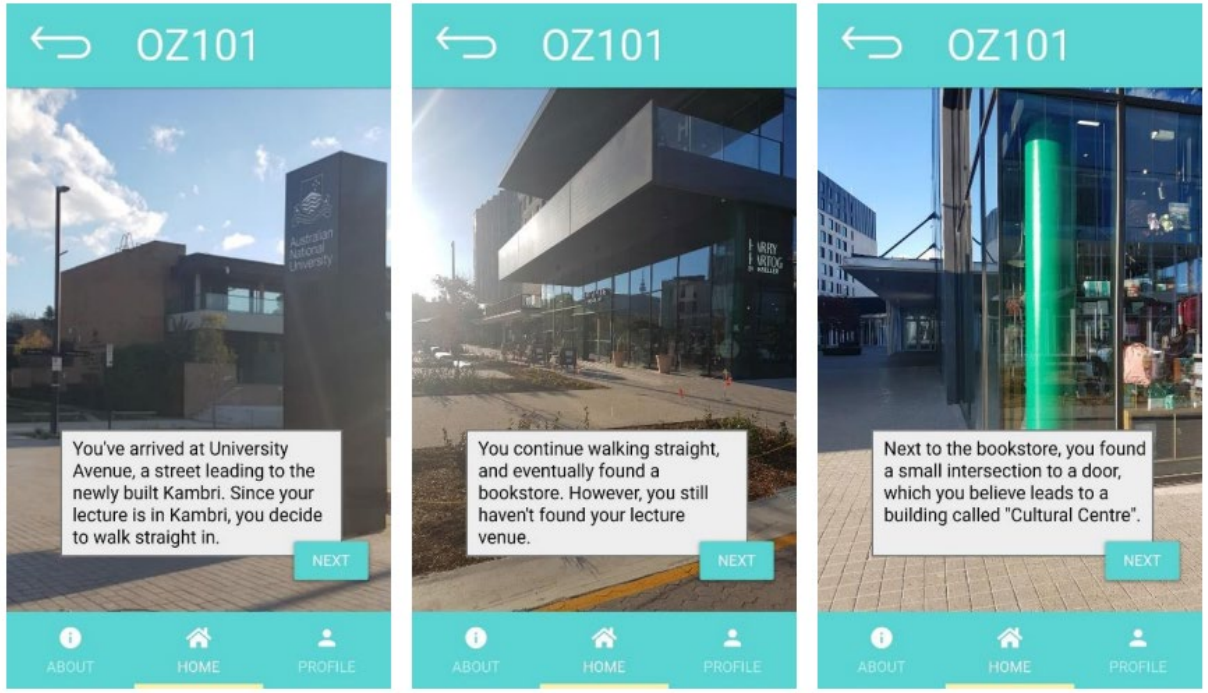
- This mobile application is a role-playing interface system that simulates common scenarios in Australia to build international students' familiarity with:
  - **Stage 1**: The area of their new environment (in particular, the Australian National University and Canberra) and local Australian culture
  - **Stage 2**: How Australians interact with one another
  - **Stage 3**: Once familiarity for these concepts were achieved, this prototype would encourage international students to interact and mingle with other people in real life by introducing them to the ways in which they could do so.



Details of Prototype: Stage 1

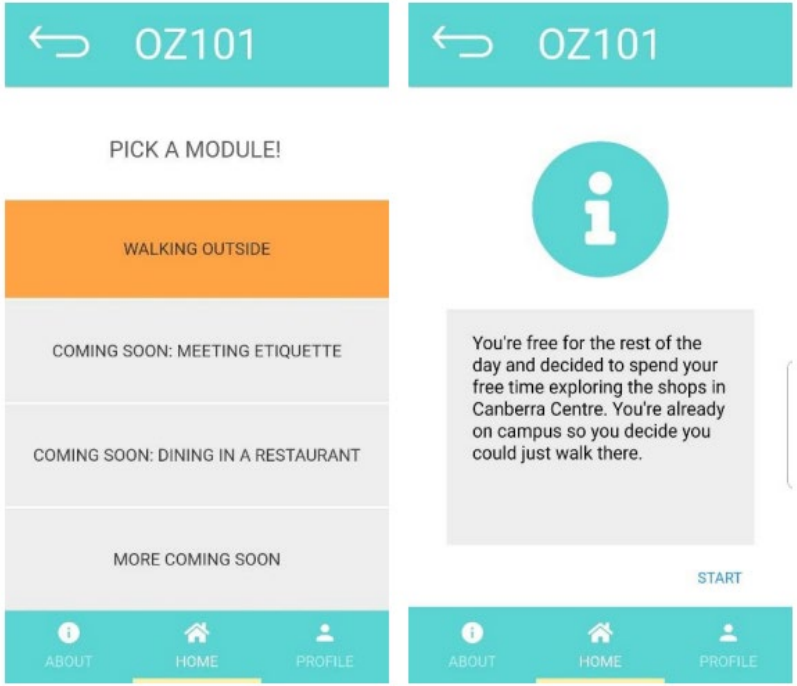
- Stage 1 was designed to help international students familiarise themselves with the **area** around the Australian National University and Canberra, and the **local culture** of Australia. This was done by creating modules that simulate common scenarios regarding the area and local culture that international students could learn about

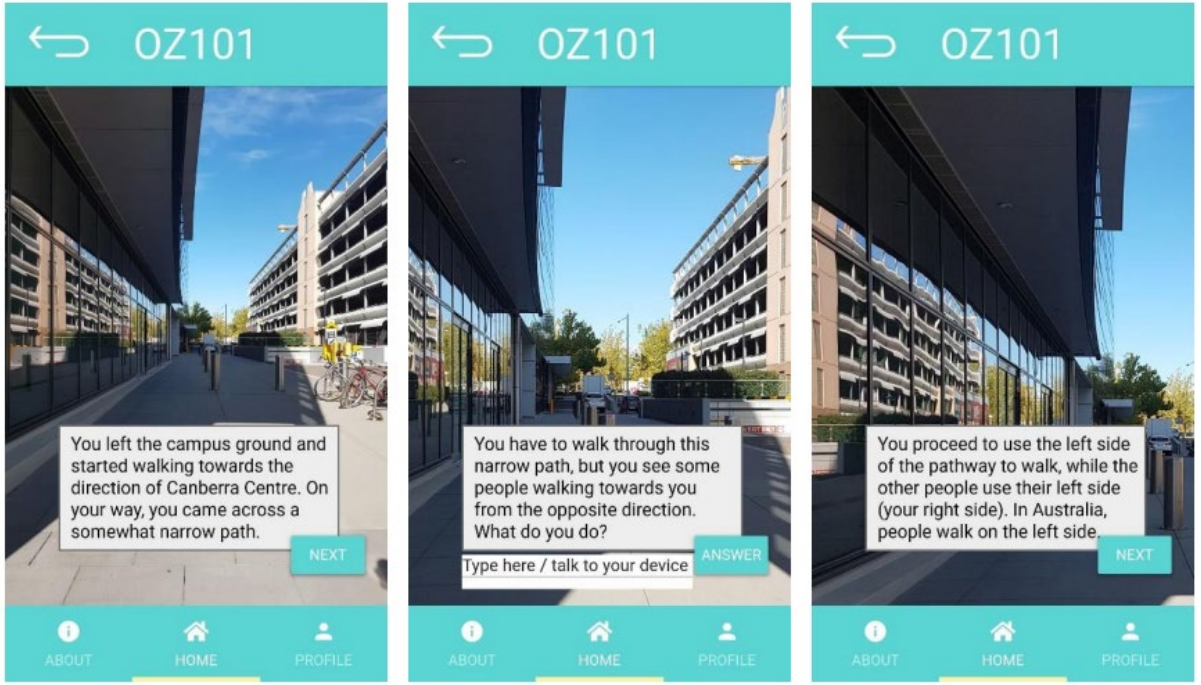




A simulation for finding the location of a lecture hall for a class

Details of Prototype: Stage 1 (cont'd)

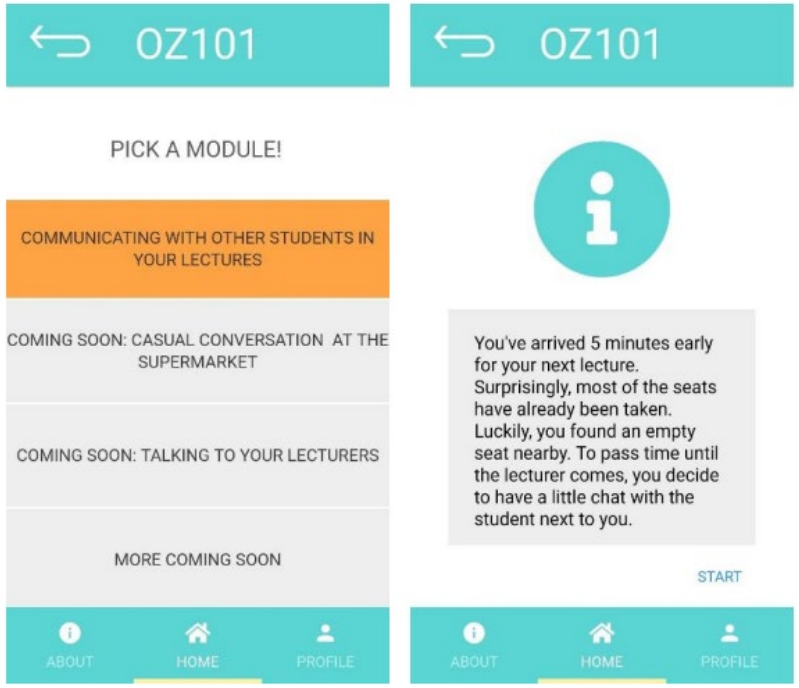


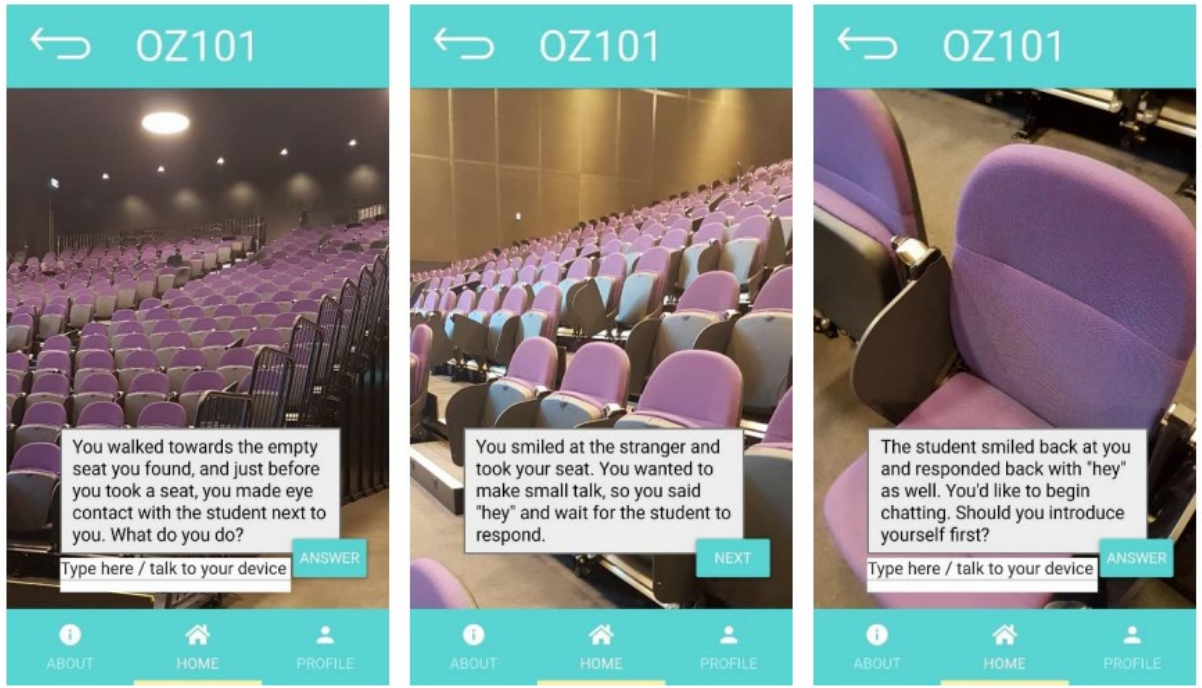


A simulation for navigating around a busy street

Details of Prototype: Stage 2

- Stage 2 was designed to help international students familiarise themselves with how Australians interact. This was done by creating modules that simulate common scenarios regarding **ways of communication** that international students could learn from.

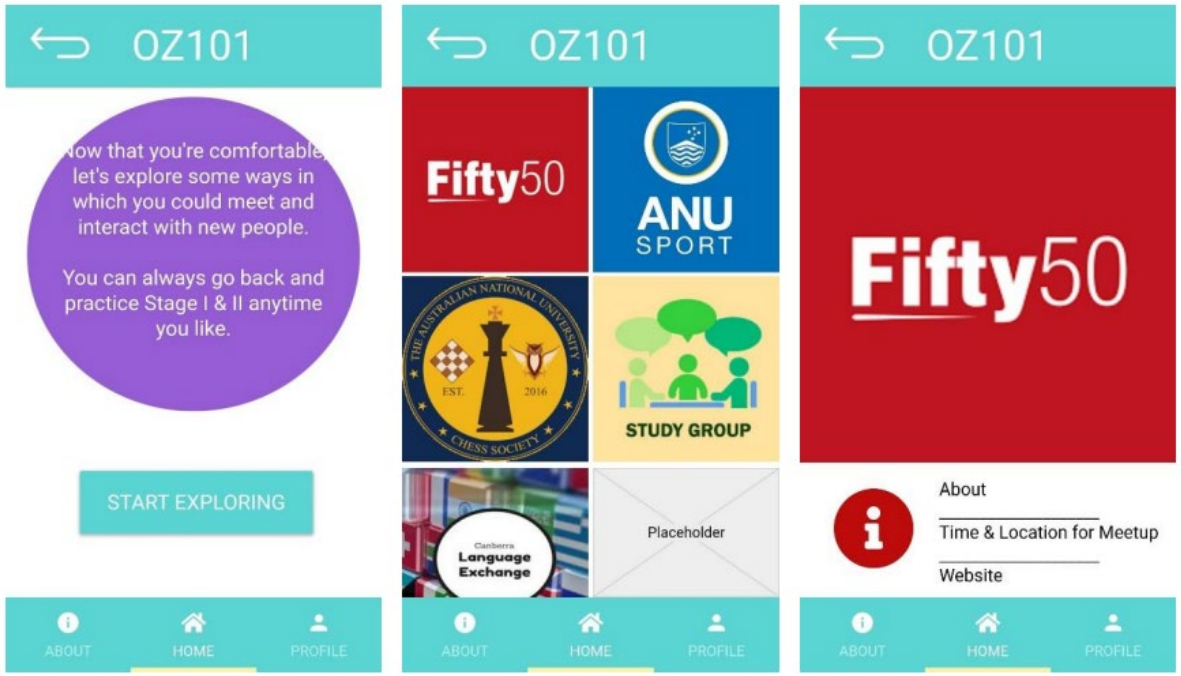




A simulation for communication etiquette during a lecture

Details of Prototype: Stage 3

- Stage 3, also called ‘personal development’, was designed as a way to **direct international students to avenues in which they could meet and interact with new people in real life** through whatever similarity they might choose, such as existing clubs and societies, study groups, or anything else that could enable social interaction among students.



Key Outcomes

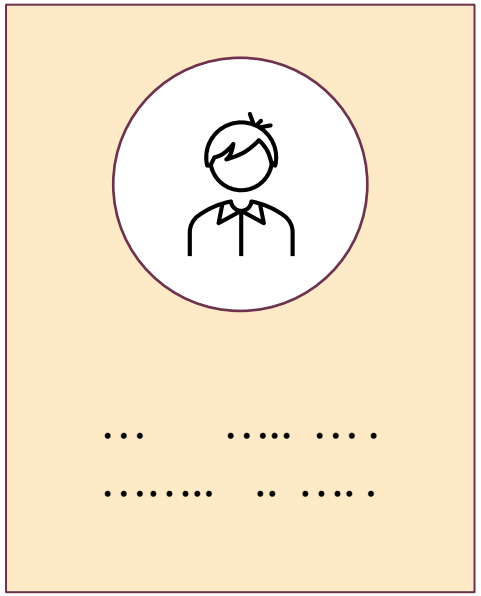
- Identification of root cause of loneliness and social isolation among international university students in Australia.
- A mobile prototype for a role-playing interface system for helping international students build familiarity with the area, culture, and ways of communication in a new environment.
- Other potential solutions that can be explored for future work.
  - An interactive guidebook
  - A platform that connects students together based on similar courses/interests, or to form cooking or exercising groups
- Publication in the New Zealand Mental Health Conference (2020) (report & poster).
- An Honours Thesis that received High Distinction.

Learning Points

- The root cause of an issue must first be identified before coming up with potential solutions.
- Simulation and hypothetical scenarios can be used to handle the ethical barriers associated with investigating sensitive issues.
- Gender ratio of participants should be taken into account, as some insights could have been missed without balanced gender representations (e.g., things that women might want to know that men had not thought off or vice versa).

Case Study 4:

Identifying Open Data Users



Disclaimer

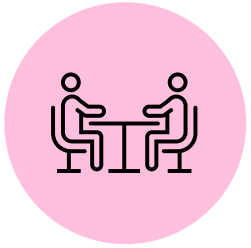
- This project was conducted as part of my user research internship with the Engineering and Design Team at Data61, CSIRO. It is covered under a **Non-Disclosure Agreement**. Therefore, many details have to be omitted.

Aim

- Develop a wider, more comprehensive understanding of different open data users

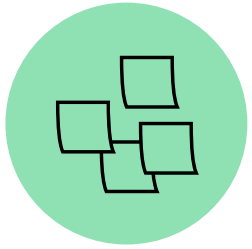
Summary of Methods

Background &
Literature Review



Individual
Interviews

Personas



Qualitative
Data Analysis

Details

- Gathered existing Data61 user research and developed a wider, more comprehensive understanding of open data users
- Planned and conducted interviews with identified open data users
- Extracted findings and insights to support stakeholders working with open data
- Published findings as a report and a set of personas

Key Outcomes

- Identified different open data users, including their characteristics and requirements.
- Increased awareness regarding different open data users among current employees by disseminating the information via presentations.
- Created user personas for each open data user type, and published findings in a report.

Learning Points

- Ample time should be allocated to account for participant withdrawal.
- How a type of ‘user’ is visually portrayed in user personas could affect people’s perception/bias towards this type of ‘user’. It is good to include diversity in terms of visual representation of users.

Navigation tabs

LANDING PAGE

Case Study 5:

Building an e-Commerce Website

Disclaimer

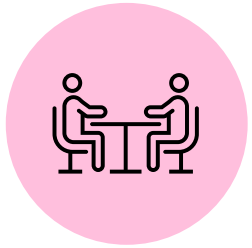
- This project was conducted as part of my year-long TechLauncher industry placement with Collagis. It is covered under a **Non-Disclosure Agreement**. Therefore, many details have to be omitted.

Aim

- Design and develop an e-Commerce website following the client's project requirements

Summary of Methods

Background & Literature Review

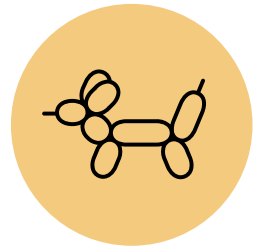


Individual Interviews

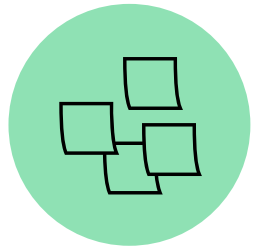
Personas

Storyboarding

Ideation, Sketching, & Wireframing



Prototyping



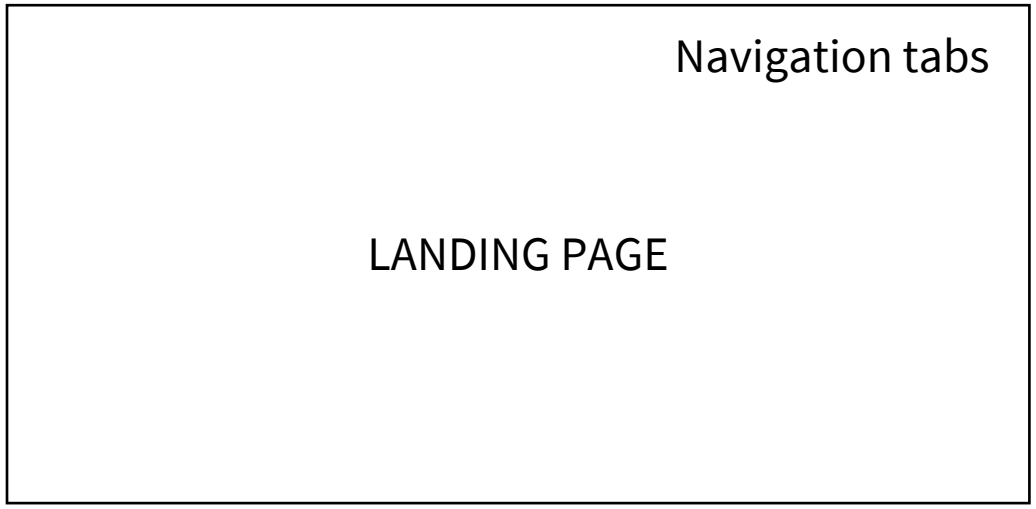
Qualitative Data Analysis

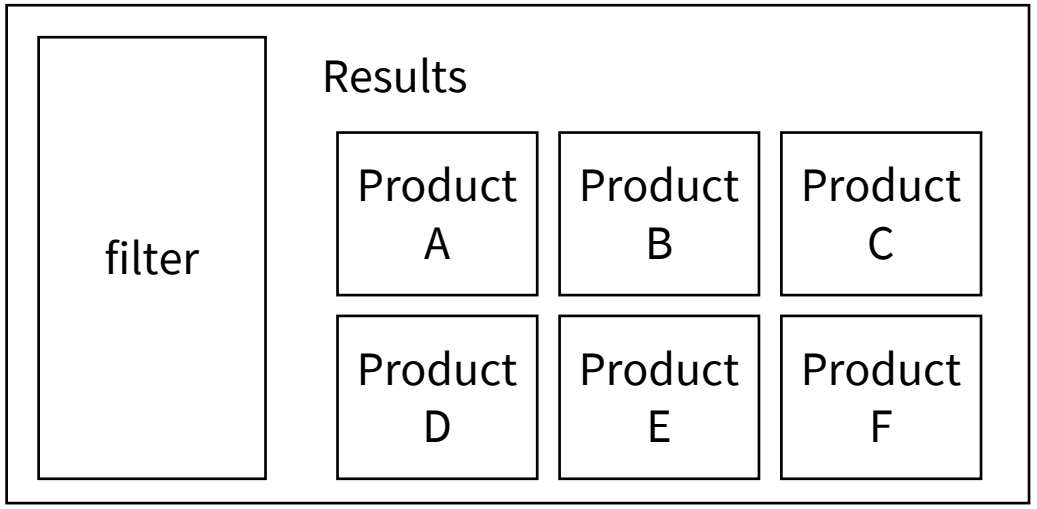
Details

- Worked collaboratively in a team of 6 to design an e-Commerce website
  - Team members include a project manager, 3 web developers, a business analyst, and myself as UX designer
- Analysed client requirements and developed wireframes and prototypes
- Developed storyboard and posters for internal and public presentations
- Worked with HTML, SCSS, and React to develop and design web pages
- Managed detailed meeting minutes for weekly team meetings

Key Outcomes

- Created storyboards, posters, and wireframes relevant to the project for the client
- As a team, developed multiple iterations of the e-Commerce website on local host
- Developed a minimum viable product (MVP) linked to a functional, temporary database, as a final deliverable





Learning Points

- Prepare multiple options when presenting potential solution to clients.
- Have an early discussion with clients relating to the priority and urgency of each feature.
- Pay attention to the company’s branding guidelines (including fonts, colour themes, etc.) when designing the interface

Want to hear more?

Please contact me at

michelle.adiwangsa@gmail.com