Wandertrust

Project Overview - Team Kaha

1 - Solution overview

Problem statement

When used to their potential, public spaces are able to build a sense of community, improve health and wellbeing, and provide safe meeting areas in a post-COVID era. How can we improve public spaces and encourage people to use them?

Proposed Solution

We propose an integrated system to take open data on public spaces, enrich it with constant feedback from users of public spaces, and present this data to users and providers of the public spaces. Users will have an app to do the following:

1) Receive personalised public space recommendations based upon their preferences

2) Provide actionable insights back to providers (councils & governments) based upon what can be improved about each public space

Providers can use this feedback to assess how public spaces are being used, how to improve existing public spaces, and how to provide new public spaces to answer unmet requirements.

Public spaces are identified by QR codes. Accessing this code without the app will lead to the website, where feedback can be provided and the app can be downloaded. Using the app to scan the QR code will lead to the same feedback interface.

The user can search for public spaces through the app, with a list of criteria applied to the search. Some example searches are: *parks with playgrounds*, *sports facilities currently available*, or *accessible spaces with shaded seating*.

Users will also be able to build an anonymous or pseudonymous public profile through the app, with possible gamification based on incentives.

For users who do not use the app nor the QR codes, we suggest feedback kiosks in key amenities for quick and easy feedback. Data from the kiosk is wirelessly sent back to the app backend. The kiosks would present a substantially simplified, robust interface to withstand outdoor weather conditions.

2 - User journey

Finding public spaces

UX journey 1: User visits a park, beach or a museum and finds a poster with a QR code to provide feedback. The user scans the QR code which leads them to the web page of Wandertrust (https://wandertrust.herokuapp.com/). The page suggests downloading the Wandertrust app from the app store as an option. The user then is presented with a page to provide feedback based on the public space they are located at.

UX journey 2: If the user has chosen to download the app and create an account, they can use the app to find public spaces that share similar attributes to what they have liked before. The user can choose to read more about any of the suggestions provided, e.g. they find "Ashfield Park" as the top suggested park to visit, they choose to learn more about the park to see if they like the description, how far it is, and what amenities it offers.
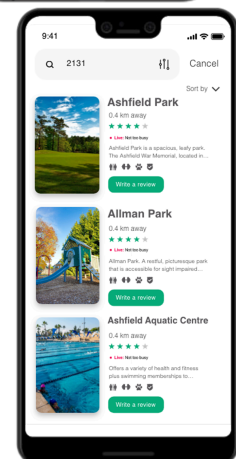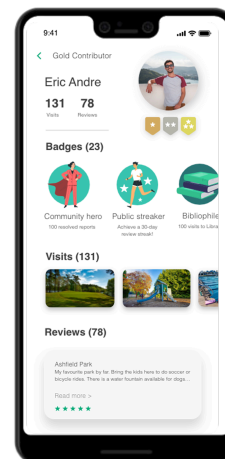
UX journey 3: For users who don't have the app downloaded and don't use QR codes, they can find Wandertrust feedback kiosks in public spaces to leave feedback about the experience they had in the space.
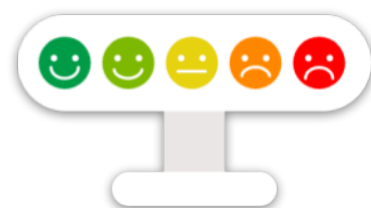
Providing feedback

Feedback method 1: The user can provide feedback by scanning a QR code which leads to the Wandertrust web page and the user is presented with a feedback form.

Feedback method 2: For community members who encounter difficulty in scanning QR codes or are unaware of how to do so (non-tech savvy people, people who don't have access to smartphones), feedback kiosks provide an easy alternative to provide feedback. The user can directly select one of the icons to indicate their level of satisfaction with the service.

3 - Recommendation engine

Input feature translation

Consider a sample user journey where Tom is interested in going to an outdoor park or a sports area that has a toilet as a minimum amenity requirement.
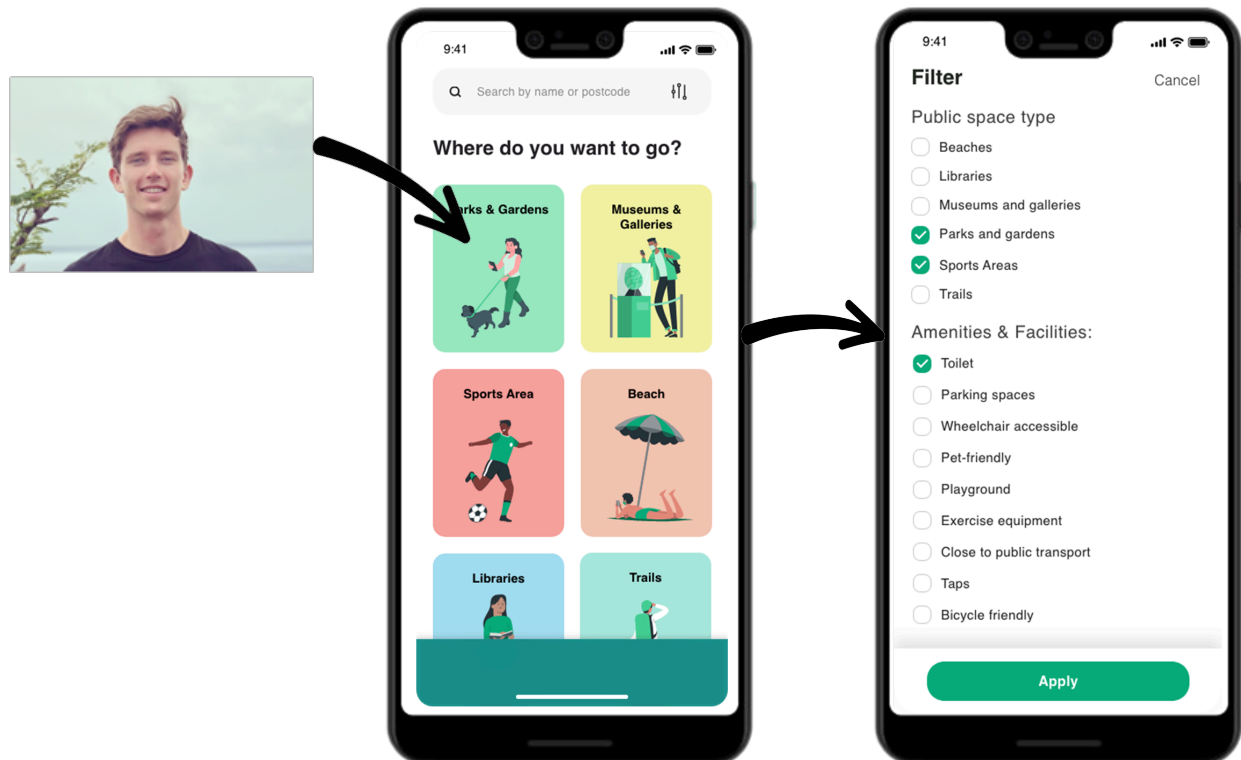
Each of the amenity and facility features would be one-hot-encoded to construct the feature dataset summarised in Table 1. Note that in practice, "Yes" would be encoded as 1 and "No" would be encoded as 0.

Table 1 - Example user-level feature table

User ID	Latitude	Longitude	Time of day	Public space(s)	Toilet	...	Taps	Bicycle friendly
AA11	33.91	151.13	9:41am	Parks / sports areas	Yes		No	No

In order to alleviate data privacy concerns, each user will be attributed their own unique user ID which is completely anonymous. In this case, Tom has been assigned the ID *AA11*. Note that the latitude and longitude of the user would be obtained by enabling location services for the app.

Public space-level features

Table 2.1 - Feature attribution method for spaces

Feature	Feature description	Data source	Derivation method
Public space location	Latitude & longitude coordinates of the public space	NSW Point of Interest dataset NSW GOVERNMENT Spatial Services Google geocoding API Google APIs	Identify the list of points of interest using the Spatial services point of interest web portal data extract functionality ([here](#)) Determine the co-ordinates of the public spaces by feeding the names of each space into the geocoding API by Google
Space sentiment ★★★★☆	Rating from 1 -5 stars for the space as a whole	App rating Wander trust Twitter API	Use the Twitter API to collate geo-tagged tweets for the spaces of interest and conduct sentiment analysis to classify into a 5 star rating (use deep-learning)
Activity rating	Numeric rating 1-5 to represent the level of exercise at the current public space	Strava API	Use the Strava API (either Get Activity Zones / Get Activity Streams) to quantify the degree of exercise in the associated area
Safety rating	Perception of public safety	Google geocoding API Google APIs NSW Bureau of Crime Statistics and Research data NSW Bureau of Crime Statistics and Research	Derive the proximity to police stations by geocoding police station addresses and calculating the distance between their co-ordinates to the public space co-ordinates Take the mean / median rank score across all crimes (e.g. assault, sexual offences, robbery, break and enter etc.) by LGA using the Crime Bureau Statistics file

Consider an example of three public spaces:

(1) Ashfield Park

(2) Allman Park

(3) Ashfield Aquatic Centre

Using the feature attribution process summarised in Table 2.1, the public space feature table would be constructed as seen in Table 2.2.

Table 2.2 - Example public space feature table

Public space	Latitude	Longitude	Public space type	....	Safety rating	Toilet
Ashfield Park	33.88	151.13	Museum		10	Yes
Allman Park	33.89	151.13	Park		3	No
Ashfield Aquatic Centre	33.88	151.12	Beach		8	Yes

Note that the ellipses represent all of the other features defined for the respective spaces (see *Input feature translation* section for comprehensive list).

Co-dependent features

The final group of features are those derived from the integration of both user and public space features and are summarised in Table 3.1.

Table 3.1 - Integrated feature methodology

Feature	Description	Data source	Derivation method
Distance to space	Numeric variable to represent the distance (in km) that they would be willing to travel to get to the public space	Latitude & longitude co-ordinates of the user and the public spaces	Compute distance between user lat/lon and lat/lon co-ordinates of each public space using the Haversine formula

Space occupancy • **Live:** Not too busy	The current total number of people in the space	Census of Population and Housing: Mesh Block Counts **Australian Bureau of Statistics** Real-time mobility data (e.g. Pedestrian counting system Melbourne)	Retrieve the number of people in the public space using the real-time data from the mobility sensors. Determine occupancy rates by combining with census data / data associated with public space capacity
Parking availability **P**	Numeric rating 1-5 (5 denoting lots of parks available)	Transport NSW open data car park API open data	Use the API to retrieve information on real-time parking information for the points of interest

Table 3.2 - Example integrated feature table

User ID	Public space	Distance to space	Space occupancy	Parking availability
AA11	Ashfield Park	0.4km	Not too busy	5
AA11	Allman Park	0.4km	Not too busy	3
AA11	Ashfield Aquatic Centre	0.4km	Not too busy	3

Note that the space occupancy and parking availability metrics are also considered integrated / co-dependent features as they depend upon the current conditions at the spaces of interest (time dependency).

Producing recommendations

After formulating the required feature datasets, they are combined together and processed into a recommendation engine to produce recommendations to the user. The recommendation engine compares the user preferences (represented in the user-level feature set) to the public space attributes for each space nearby to determine the most suitable options for the user.
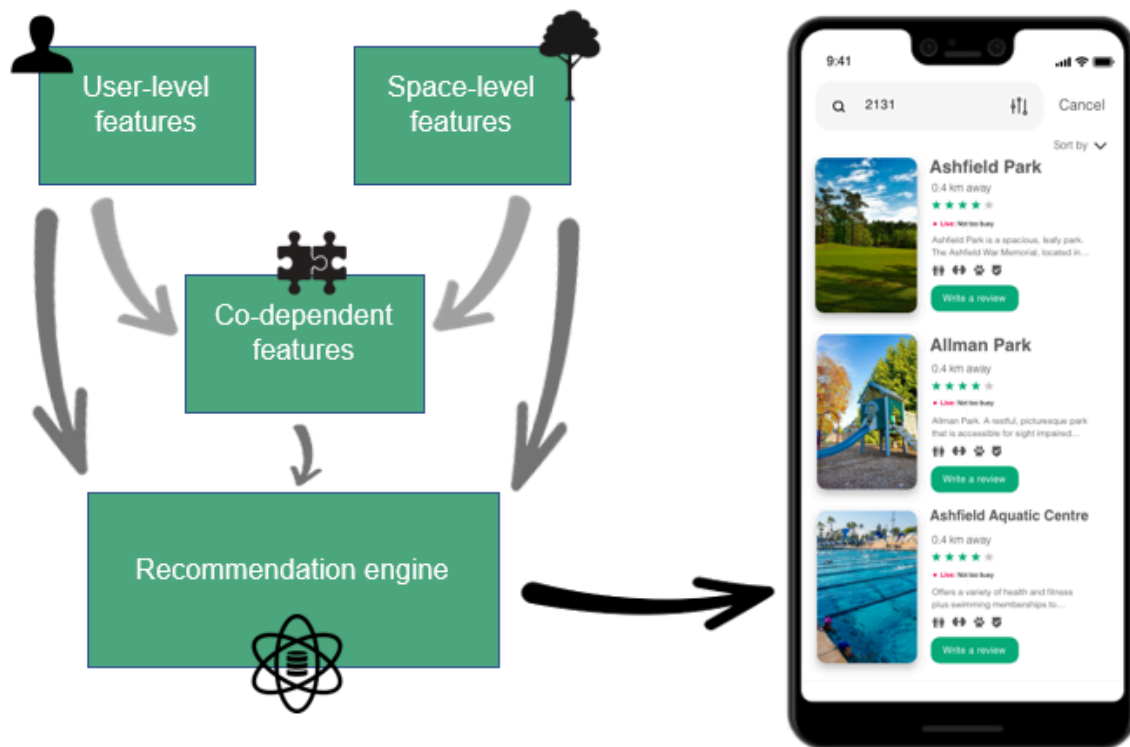
4 - Incentive status and tier system
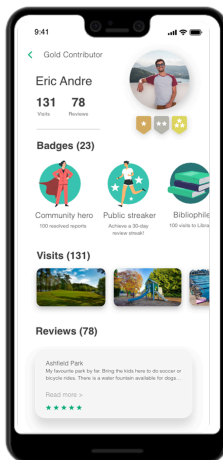
Incentives are based on:
- Number of places visited
- Number of ratings provided
- Number of reported issues that have been resolved

Users will be encouraged to achieve core badges in order to move up the tier system. There will also be 3 badges released monthly where, after achieving 2 of the 3 badges, users will enjoy rewards based on their tier status.

Core badges

There will be three core badges which only need to be achieved once. The goal of these badges are to place users on the tier system.

Adventurer
10 new places

Connoisseur
20 ratings

Community hero
100 resolved reports

Table 4.1 - Wandertrust tier system

Basic User (Bronze)	Regular User (Silver)	Trusted User (Gold)
Adventurer	Adventurer Connoisseur	Adventurer Connoisseur Community Hero

Monthly badges

To qualify for rewards, users must achieve 2 monthly badges of the current month. 3 badges will be released monthly with 1 being relatively easy and the other 2 presenting more of a challenge. Badges have to be reasonably achievable to maintain user engagement.

Green Fingers

Visited a community garden

Public streaker

Achieve a 30-day review streak!

Bibliophile

100 visits to Libraries

Rewards are based on Tier status:

Bronze: 1 free coffee at a participating businesses
Silver: 5% off at a participating businesses
Gold: 10% off at a participating businesses

Rewards will only be applicable for the month.

Badges can be designed to incentivise users to visit underutilised spaces and can also be themed to commemorate significant dates in the community.

How does this benefit everyone?

The tier system is a win-win-win for everyone involved. Local community members will feel empowered by being able to contribute to making their public spaces better, local businesses surrounding public spaces will receive more foot traffic and become a meeting place for community members. Additionally, local councils and governments will also have another data source that provides insight into what the community wants and local councils can use this to plan future spaces in the local area. This can also be used to validate findings from census data.

The incentive system is designed to see the following desired outcomes:

- High quality public spaces

- High utilization of public spaces

- Interaction and socialisation between community members

  - Meeting people in the community and participating in local initiatives (e.g. library groups, exercise groups, volunteering at museums)

  - Building community within the app
  ("How many Wandertrust badges do you have?")

- Greater trust between community and government

- Places perceived as unsafe are transformed to safe and inviting by being frequented more and improved conditions based on user feedback

Table 4.1 - Benefits of the tier system for community, local businesses and governments

Community	Local business	Government
- High quality public space for use - Discover new places to visit - Easier to participate and interact within the community	- More foot traffic leads to more business - Better, safer environment to operate	- Better feedback system for maintenance of public spaces - Real-time data on utilisation of public spaces - Greater understanding of uniqueness across different areas

5 - Implementation roadmap

Milestone	Priority	Type	Status
Recommendation engine How the app recommends spaces, based on user preference and open data. This will be progressively enhanced by app use.	Core	Technical	Complete
App user interface The app frontend for users to search, receive recommendations, and provide feedback or raise alerts.	Core	Technical	In progress
Data schema The structure of the data used by the app.	Core	Technical	In progress
APIs Interface points between the core data and other parts of the system: app; kiosks; open data sets; government users.	Core	Technical	In progress
Data storage system The implementation of a cloud storage for the core data.	Core	Technical	To do
Open data integration Initial and ongoing input of open data sets into the core data.	Core	Technical	In progress
Government interface The interface which government (public space providers) use to receive feedback and alerts, and push out responses.	Core	Technical	To do
Connect with local government/council Policy and business agreements with the local government to implement the system.	Core	Engagement	To do
Incentive tier system The personalised, gamified aspect to encourage app uptake and use.	High	Business	In progress
Market incentive system to businesses Linking the incentive system to businesses to provide rewards for app use.	High	Engagement	To do
Develop feedback kiosk Design physical kiosks for public spaces.	Medium	Technical Engagement	To do
Roll out feedback kiosks Produce and deploy kiosks in public spaces.	Medium	Engagement	To do