ILLUSTRATION

BARRIER-FREE ACCESS

Crowdsourcing Towards Barrier-Free Access

SmartBFA is a non-profit TechforGood project that uses crowdsourced path accessibility data to provide quicker, barrier-free navigation for wheelchair users. We work with wheelchair users, able-bodied volunteers and government agencies to improve Singapore's accessibility and empower wheelchair users to lead independent lives.

TEXT AND IMAGES: KAI REUBER (SMARTBFA) AND
STEPHANIE TAN (CENTRE FOR LIVEABLE CITIES)

Image: Juan Chan

Navigational Challenges

As existing map applications do not support features such as wheelchair-accessible navigation, wheelchair users may resort to scouting their entire route using Google Maps' Street View. This can take 30 to 60 minutes.

Detours may result in wheelchair users taking up to 10 times longer than an able-bodied person to reach the same destination. This discourages wheelchair users from leaving their homes, especially when faced with new places and unknown routes.

Environmental Challenges

Recommended paths on existing map applications often include stairs, kerbs and steep slopes, and alternative routes may not be safe.

Heritage shophouses have inaccessible 5-foot ways. A Powered Mobility Device user resorts to the unsheltered and busy road in tropical Singapore.
Image: Kai Reuber

Alternative routes may include unsafe back streets that feature construction activities and heavy usage by delivery vehicles.
Image: SmartBFA

A gentle slope for the able-bodied may appear as a steep ramp for wheelchair users.
Image: SmartBFA

Such difficulties in mobility and navigation can result in anxiety and low confidence levels when venturing out. This may reduce community participation and even opportunities for employment, education, and recreation, thereby impacting wheelchair users' quality of life.

This restaurant street poses many obstacles for a wheelchair user to navigate, and shops with kerbs are inaccessible.
Image: Stephanie Tan

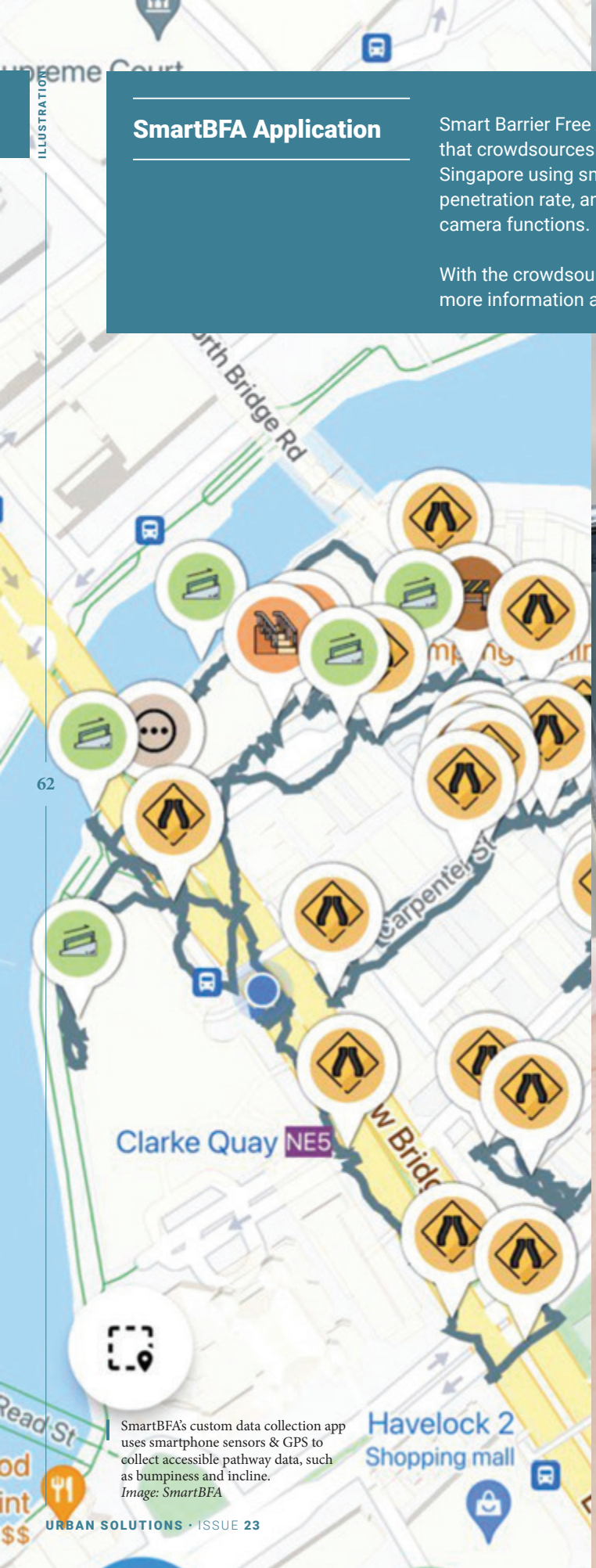
Access difficulties include the need to open heavy doors.
Image: SmartBFA

This disabled drop-off point is too close to the ramp for effective usage, and not weather-proof.
Image: SmartBFA

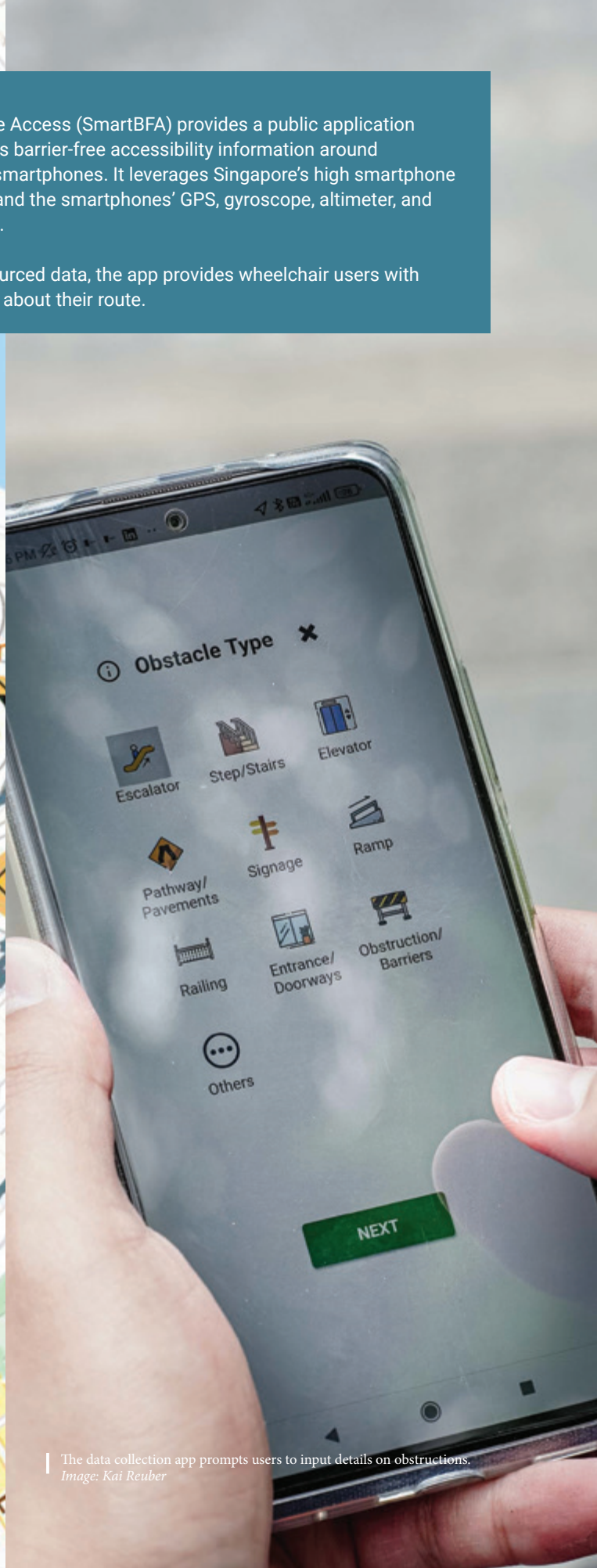
SmartBFA Application

Smart Barrier Free Access (SmartBFA) provides a public application that crowdsources barrier-free accessibility information around Singapore using smartphones. It leverages Singapore's high smartphone penetration rate, and the smartphones' GPS, gyroscope, altimeter, and camera functions.

With the crowdsourced data, the app provides wheelchair users with more information about their route.



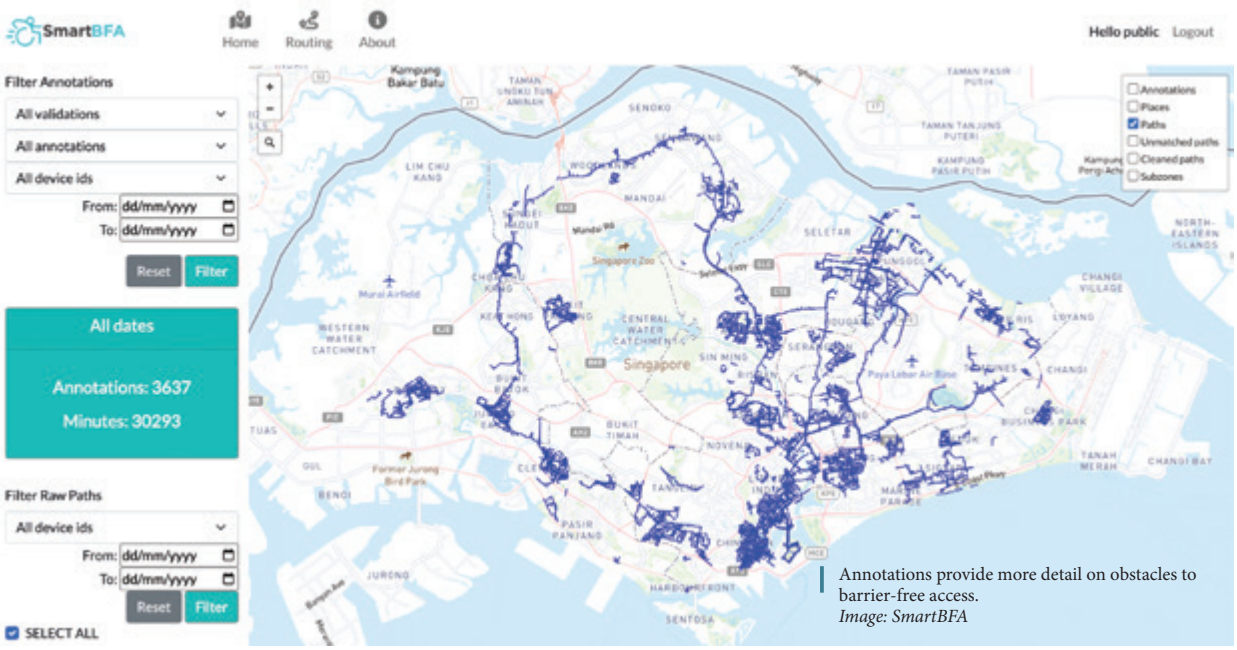
SmartBFA's custom data collection app uses smartphone sensors & GPS to collect accessible pathway data, such as bumpiness and incline.
Image: SmartBFA



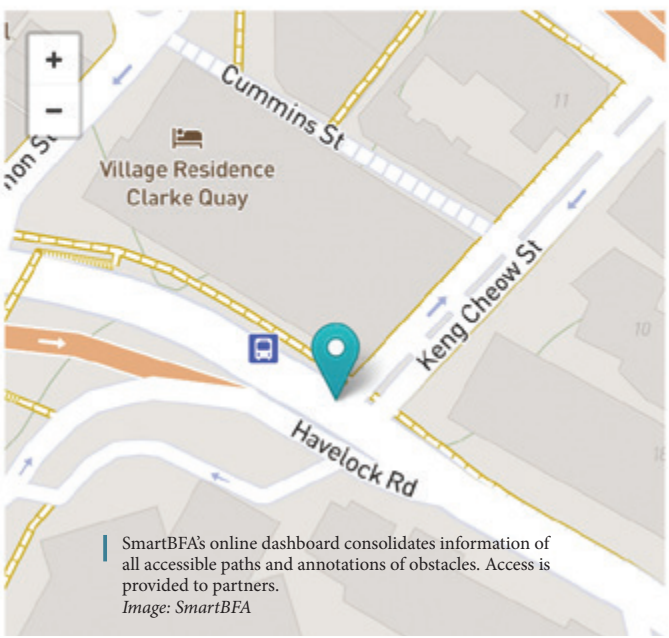
The data collection app prompts users to input details on obstructions.
Image: Kai Reuber

SmartBFA Dashboard

The crowdsourced data enables SmartBFA to create a one-stop online portal for barrier-free accessibility information in Singapore. Through this portal, the SmartBFA team communicates evidence-based recommendations to town planners and relevant public and people sector partners, such as Singapore's Urban Redevelopment Authority and the Disabled People's Association (DPA), to inform the planning of new developments and improve barrier-free accessibility on both the macro and micro levels.



Annotations provide more detail on obstacles to barrier-free access.
Image: SmartBFA



SmartBFA's online dashboard consolidates information of all accessible paths and annotations of obstacles. Access is provided to partners.
Image: SmartBFA

From Volunteer Scientist to Empathetic Neighbours

As of July 2023, SmartBFA has recruited 320 volunteers and collected 510 hours of data.

As only 20% of volunteers use a wheelchair daily, the inclusive and active participation by the wider community not only increases data collection, it also yields dividends in building awareness and empathy.

Inclusion Ambassadors are DPA members with disabilities who have undergone training to engage the public and promote inclusion.
Image: Kai Reuber

Non-wheelchair users become more aware of obstacles faced daily by wheelchair users.
Image: Kai Reuber

Senior leadership from Certis being guided by Inclusion Ambassadors to collect data in July 2023, as part of Certis' Corporate Social Responsibility programme.
Image: Kai Reuber

Next Plans

SmartBFA is an example of how thoughtful application of sensor and big data technology can enhance understanding of how different residents experience their communities and cities.

Beyond the use of data and type of technology, the ways in which the community is activated and information is shared are key to accelerating universal barrier-free access.

Funding for this TechforGood project remains critical to support plans to integrate data collection and navigation into a single app, as well as to develop additional routing capabilities for a more seamless user experience.

Image: NVM Stocker / Adobe Stock