

Integrating mobile tech into sanitation services

Insights from Pula

Topic Brief | June 2019



Executive summary

Service providers involved in faecal sludge management are held back by a lack of current data on their customer base, operating standards and levels of service. Pula, a mobile app, was developed to address this data gap.

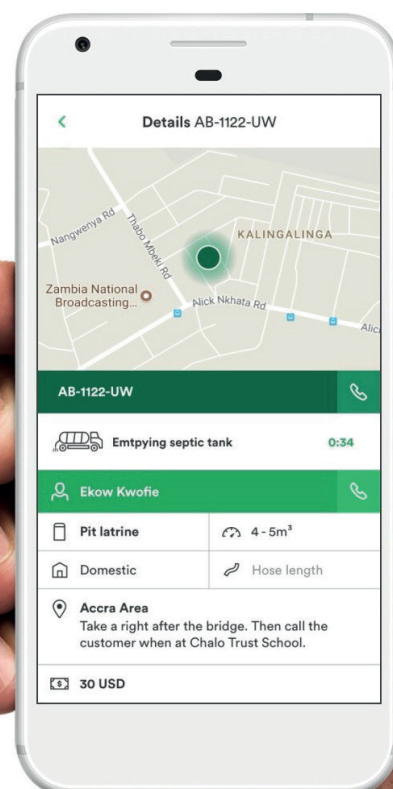
This publication shares the learning from a 3-year process of developing a Minimum Viable Product (MVP) for the Pula app. We outline how the MVP was designed and developed, supported by reflections from the app development team about the technology and user requirements.

Following initial Design Sprints in four countries – Ghana, Kenya, Mozambique and Zambia – an MVP was developed with two key features: i) an address book to support enhanced customer acquisition, enabling vacuum tank operators (VTOs) to store all customer details, and to predict when a customer is due for the next emptying; and ii) operational tracking to update business owners on the location of vehicles via GPS signals and status updates. The MVP was tested in Lusaka, Zambia, and Maputo, Mozambique.

The tests revealed the Pula app is too complex for target users in its current form and does not yet respond optimally to the contexts in which it would be used. These results were not what WSUP hoped for - but setbacks are to be expected when innovating, and the process has yielded valuable insights. So what would we do differently next time? The publication concludes with three key recommendations identified by the app development team:

- Focus on one core feature and ensure this is fit for purpose;
- Establish a relationship with one target customer, allowing the product to be tested over longer periods; and
- Focus on developing a product tailored to a single market, which can then be adapted for new markets as required.

We present this experience for others in the WASH sector with an interest in better integrating mobile phone technology into sanitation service provision in sub-Saharan Africa.



1. Project rationale

1.1 Defining the problem: the data gap for effective faecal sludge management

Around half of the global population are not connected to a sewer (WHO/UNICEF 2017), depending instead on on-site solutions such as pit latrines and septic tanks. However, systems for managing faecal sludge - the waste contained in on-site facilities like pit latrines - are often ineffective. Safe and professional emptying services can be inaccessible or unaffordable for low-income households, while for those directly involved in moving waste from toilet to treatment, the work is often unrewarding and unsafe.

Businesses providing faecal sludge management (FSM) services - such as pit emptying or septic tank desludging - often lack real-time information about staffing operations and costs; crucial information if they are to provide sanitation services citywide. Similarly, data about faecal sludge management – who collects it, where they take it, if it is treated, and how it is disposed of – is key for city authorities overseeing wastewater and faecal sludge treatment. The public sector may not deliver these services directly, but they need to act as informed overseers and regulators if FSM services are to be safe and accessible.

1.2 Defining the problem: FSM businesses face a wide range of operational challenges

The provision of FSM services is logistically complex. In addition to weak or insufficient data, businesses face a range of operational challenges (Table 1). WSUP supports sanitation enterprises in different urban contexts, including manual emptiers (WSUP 2018, 2019a) and mechanical emptiers (WSUP 2017). These experiences have repeatedly demonstrated that operational inefficiencies drain businesses of revenue and resources, limiting their overall growth and constraining their ability to serve more customers.

Table 1: Common operational challenges for mechanical FSM businesses.

Inefficient routes to customers; heavy traffic
Frequent, time-consuming hourly planning
Inefficient planning and use of fleet
Activity highly seasonal, with long periods of vehicle and staff underuse
Cost of formal disposal of collected waste
Inadequate disposal
Lack of insight about short- and medium-term revenue, costs and profits
Lack of insight about long-term business health
Drivers refuse to have their activity monitored
Drivers complete informal emptying jobs without reporting activity or payment to vehicle owner
Drivers hard to manage
Frequent vehicle breakdown

1.3 The response: developing a mobile app to support FSM businesses

Since 2016, WSUP has been developing a cloud-based mobile phone application that aimed to alleviate some of these operating issues. The app, called Pula, is designed to be used by the owners of businesses providing mechanical emptying services and the drivers of their vacuum tankers.

Pula was conceived to function as a data gathering and information sharing system, allowing business owners to make long- and short-term decisions based on real-time information about their customers and the costs of delivering their services. Two versions of the app would be developed – for business owners/supervisors and drivers respectively – with different functionalities and features. The aim was to facilitate quick and efficient communication between the two types of user. In the next section we set out the process through which the app was developed.

2. Developing and testing the app

2.1 Design Sprints

Phase 1 of the app development consisted of four Design Sprints – short, intense periods of research, design and testing. Design Sprints aimed to develop early prototypes of planned features, and to gather feedback through interviews and workshops with target users, including vacuum tanker business owners and water and sewerage utilities.

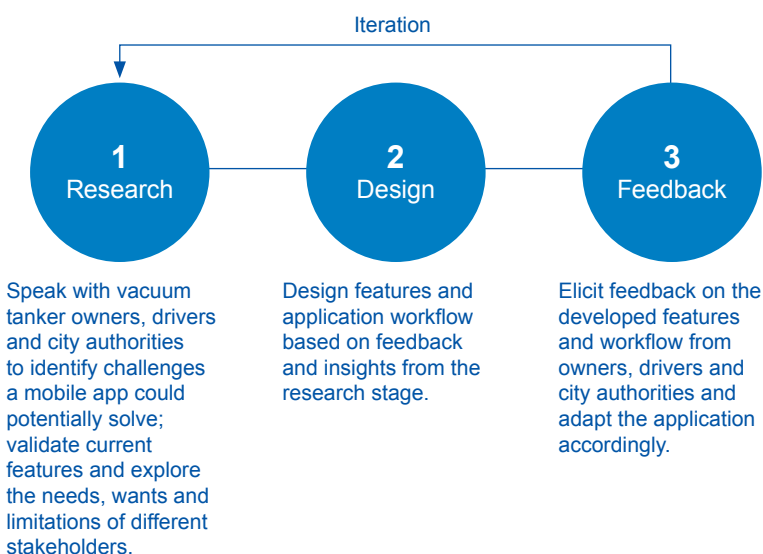
Four Design Sprints, each lasting three weeks, were conducted:

1. Ghana, December 2016
2. Kenya, April 2017
3. Zambia, November 2017
4. Mozambique, February 2018

Throughout each of the Sprints, WSUP and project partners BoP and UX applied an iterative human-centred design process to help ensure the app responded to genuine user requirements (WSUP 2019b). The Design Sprints consisted of three main activities, presented in Figure 1.

Based on user feedback from the four Sprints – beginning with the operational challenges outlined by businesses and city authorities in the research phases – potential app features were identified, adjusted and ultimately incorporated into a functional MVP (Figure 2). Through each successive Design Sprint, prototype features

Figure 1: Design Sprint cycle used in app development process.



were developed and subjected to feedback, and the app was further refined.

2.2 The Minimum Viable Product (MVP)

The Design Sprint process resulted in an MVP with two key features, as prioritised by business owners: Address Book and Truck Overview (Figure 3, p.5).

Figure 2: Evolution of Pula app features.

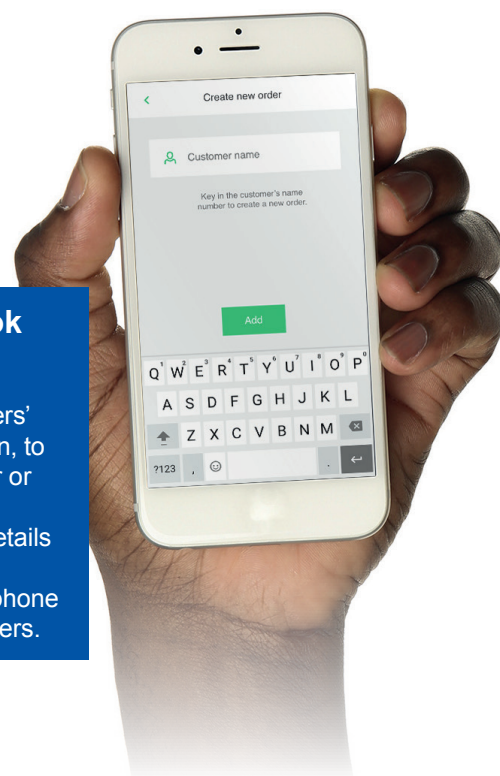
Operational challenge outlined by businesses and city authorities	Responding prototype feature developed in Design Sprint 1	Refined prototype feature developed by end of Design Sprint 4 and included in the MVP
Businesses do not proactively approach potential customers – they wait for customers to contact them, despite long periods of downtime during the dry season	Client Details: Allows customers to keep a record of existing customers and to add new customers and highlights those who may soon require emptying services	Address Book
Drivers perform informal emptying jobs which are not reported to management	Truck Tracking: The app will track the drivers and give the owner an overview of activity	Truck Overview
Owners/supervisors have a limited overview of daily revenue and tanker activity	Financials: Payments, expenses and overall revenue on easy display for owners	Daily Overview

Figure 3: Key features included in the MVP.



Key feature: Address Book

The app's "address book" feature enables information about customers' tanks or pits, including their location, to be captured by the business owner or supervisor at the head office when clients call. Using the app, these details can then be transmitted to a driver, eliminating the need for repetitive phone calls between supervisors and drivers.



Key feature: Truck Overview

The app's "truck overview" feature facilitates operational tracking of the vehicle by the business owner or supervisor. The mobile phone of the driver is connected to the mobile phone of the owner. The driver is prompted to provide status updates, which the supervisor/owner can confirm through checking their GPS location.

2.3 Testing the MVP

The MVP was tested for a month in Maputo (September 2018) and Lusaka (November 2018). The testing period consisted of three main activities:

- Six tests using cars to identify GPS tracking and connection issues
- Meetings with 11 different vacuum tank businesses (five in Maputo and six in Lusaka)
- 1-day live tests with six vacuum tank businesses (3 in each city)

The tests revealed 40 small-scale functional issues, leading to five new versions of the app being developed and retested. These issues, such as incorrect neighbourhood names being displayed and drivers receiving the wrong notifications, were easy to resolve and did not involve a full redesign of the app. However, two major issues were uncovered in both cities, detailed on p.6.

Key issue: the MVP is overly reliant on strong internet connection

- If connection is slow (as is often the case in both Maputo and Lusaka), the app's functionality decreases markedly, with users experiencing lag, disconnection or app closure. These connectivity issues limited how much feedback about usability could be captured. Drivers were not willing to use their data throughout the day, for reasons of cost, and the MVP would not run smoothly on old smartphones.

Key issue: users considered the MVP to be too complex

- App features were reported to be hard to understand, and in some cases, inadvertently made users' jobs more complex, rather than simplifying their workflow as intended. For example, the command 'Assign order to truck' was not immediately clear to business owners and supervisors, negating its usefulness.

Notwithstanding these issues, vacuum tanker businesses did consider Pula's two main features, Truck Overview and Address Book, to be useful; however, the MVP did not provide enough benefit for business owners to consider integrating it into their operations without significant changes to the app's design. The MVP testing period demonstrated that the app in its current state is not sufficiently robust, reliable or user-friendly to impact positively on vacuum tank business operations.



Image: Small-scale FSM operator in Maputo.

3. What we would do differently

Testing of the MVP did not produce the results that WSUP and our partners hoped for. However, setbacks should always be expected when attempting to innovate new products and services, particularly in a challenging sector like urban sanitation. The process has resulted in valuable learning for WSUP and others in the sector to take forward into future projects. Below we present three key recommendations, based on steps taken during the project, outcomes, and analysis of what we would do differently – with the luxury of hindsight!

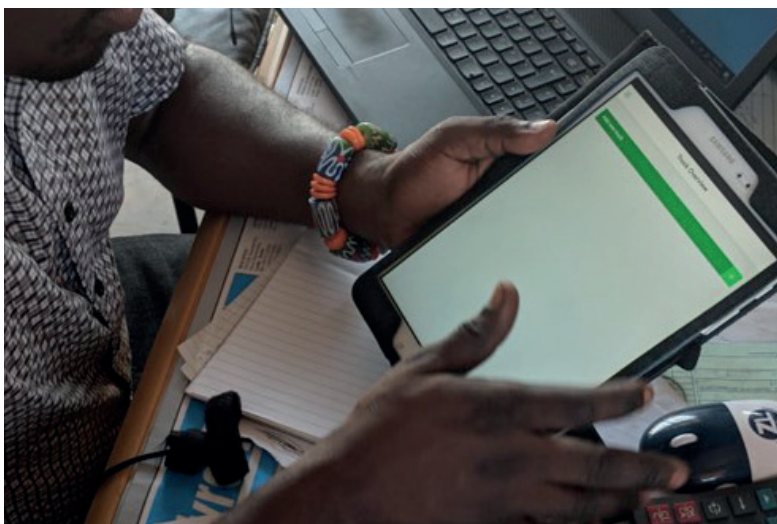


Image: Testing prototypes with a sanitation business. Credit: Jakob Kisker.



Recommendation 1: Reduce complexity

- **What happened:** Several prototype features were developed as a response to the common problems reported by sanitation business owners. These were reduced throughout the Design Sprints to two main functionalities. However, the app was too complex for target users, as found during the MVP tests in Maputo and Lusaka.
- **Recommendation:** Focus on one core feature and ensure it is completely fit for purpose. Complexity creates space for things to go wrong.



Recommendation 2: Have a 'hero customer'

- **What happened:** Multiple vacuum tanker businesses were involved throughout the project, from design research to prototype assessment and testing the MVP.
- **Recommendation:** Establish a relationship with one target business, allowing the app to be tested consistently over longer periods.



Recommendation 3: Focus on one market

- **What happened:** Design Sprints were conducted in four countries - Ghana, Kenya, Mozambique and Zambia.
- **Recommendation:** Develop a product that is tailored to a single market. This can be adapted to new markets if required.

4. Conclusion and next steps

The sanitation business owners involved in this project remain interested in the idea of Pula; both drivers and owners continue to express enthusiasm for a mobile app that responds to their specific roles and requirements.

Sanitation regulators and municipal authorities in the cities where Pula was developed still require accurate and up-to-date data about on-site sanitation services provided by businesses. If a critical mass of service providers use Pula or a similar app to collect information about emptying, transport and disposal, this would be a huge help in planning for and delivering city-wide FSM services that cover the full sanitation chain.

Before that can be achieved, Pula will require significant changes if mechanical emptying businesses are to integrate the service into their daily operations. The app needs to be simplified and made more robust if it is to optimally respond to the cities where it needs to function.

While the version of Pula outlined in this report will not be taken forward, there remains scope to develop a leaner, simpler version that could better respond to the requirements of FSM businesses. Following the MVP testing period, a simpler version of Pula has been outlined for potential future development. WSUP is optimistic that if the required changes are made, Pula can provide effective support to FSM businesses in the future. A similar product has been developed and successfully trialled by Practica and Protos in Mali, for example, where an app called Kolochilikelan has been successfully embraced by vacuum tank business bodies (pS-Eau 2018).



Image: Mechanical pit emptiers in Maputo. **Credit:** Mario Macilau.

References

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WSUP (2019a) Triggers for growing a sanitation business aimed at low-income customers: experience from 5 cities

WSUP (2019b) Design, Prototype, Test: using Design Sprints to develop an app for sanitation service providers



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Cover image: Live test of Pula with driver. **Credit:** Jakob Kisker.