Pula: the mobile Application for FSM

Project Progress report: September 2017 to March 2018

Donor	VIA Water / BMGF
Project partners	Water & Sanitation for the Urban Poor, BoP Innovation Centre, UX
Project title	PULA: the mobile Application for FSM
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Contribution from VIA Water	€159,525
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Background

One of the main challenges experienced by **private service providers** in the faecal sludge management (FSM) market is the multiple inefficiencies that arise in service delivery. Challenges such as unknown customer locations, ineffective marketing and an inability to manage fleets of vehicles are preventing providers from adapting and growing to be able to reach all consumers with safe, effective sanitation services. The **public sector** has also been at pains to respond and positively influence the market in terms of improving dumping practices and reaching low-income communities with affordable services.

For both private and public sector stakeholders within the FSM sector, access to data is crucial for making informed and effective decisions. However, such data is often unavailable, inaccurate or difficult to manage and use effectively to improve service delivery – particularly in low-income areas.

To generate such data, this project proposes to develop a mobile, cloud-based application called Pula that will strengthen the management and efficiency of sanitation emptying businesses, while providing aggregated, anonymised and up-to-date data to sanitation authorities. This, in turn, will allow for improved sanitation planning, regulation and project implementation, significantly contributing towards achieving universal access to safe FSM services in developing cities.

Aim of the Project

This project aims to develop a minimum viable product (MVP) – a functional mobile Application (Pula) that will strengthen the operations of vacuum tanker businesses while generating data on the state of the sanitation sector within target cities. Pula will be used by both drivers and business owners, and by city authorities/municipalities. There will be three versions – one for each stakeholder (driver, owner, authorities) – with data generated from one version feeding into the others.

Pre-project delivery progress (activities up to September 2017)

WSUP carried out market assessment and validation activities in Ghana and Kenya. These activities enabled us to understand the sector and context in which Pula will operate, as well as to gain an understanding of the main requirements and limitations of potential users.

During this inception phase, we achieved the following:

Activity 1. Market Assessment in Ghana (**December 2016 to January 2017)**

- Developed application features based on interviews with relevant stakeholders;
- Developed a prototype and validated this with stakeholders;
- Outlined a business model including value propositions for client groups.

Activity 2. Market Assessment in Kenya (February to March 2017)

- Gained feedback on the features developed in Ghana through interviews and workshops with stakeholders;
- Ranked existing features and developed new features based on qualitative research;
- Assessed the business model and value propositions strengthening the case for developing a minimum viable product for Pula.

These market assessment activities generated the following list of features that the team would later explore when developing the Pula Application, in Maputo and Lusaka, through further design sprints:

- **Job Execution and Logging:** administrating the orders and activities to support the operators in managing their businesses;
- **Active Customer Acquisition and Customer Management:** supporting drivers and tank businesses to gain more clients by offering integrated marketing services (such as text messages to previous customers to remind them to empty their pits – potentially at a discount rate)
- **Truck Tracking:** offering owners oversight of their fleet to prevent drivers from conducting illegal side business and illegal dumping.
- **Performance dashboard:** this will provide city authorities insight into how, where and when FSM services are taking place in their city. This will facilitate informed investment and analysis, paving the way for better FSM.

Based on the insights of these two design sprints, supported by The Bill and Melinda Gates Foundation, a project proposal to VIA Water was submitted to further refine the application and develop an MVP.

Activity One: Design Sprint in Lusaka, Zambia: Dec 2017

a. Background

Following the market assessment activities in Ghana and Kenya, WSUP and partners BopInc and UX (the Pula development team) took the user-centred design process to Lusaka. The aim was to gain insight into the needs of local vacuum tanker owners, drivers and authorities, and use their input to design an app that would offer the features, information and functionality needed to improve their businesses – thereby reaching more people with emptying services.

b. Summary

The design sprint in Zambia confirmed that authorities and forward-thinking vacuum tank operators are interested in Pula. Through internal discussions and stakeholder validation, we were able to decide on the most crucial features for an MVP: Customer Management, Customer Assignment Management, Activity Monitoring ("tracking of operations by assets and drivers") and.

By analysing the user flow and gaining further insights from vacuum tank operators we refined the features, moving closer to a fully working solution. We revisited how customer data is entered, which has not only made data entry more reliable but also optimised the process of assigning orders to drivers – making fleet management more straightforward. We call these two additional features, which both add value to the Customer Management and Activity Monitoring features (smart tracking of active trucks and operators), Order Assignment and Customer Data Capturing.

c. What we did: research, design and iteration

Through a series of workshops, talks, interviews and business visits to potential users in Lusaka, the Pula development team uncovered a range of new user insights. We spoke with:

- Government representatives – from two authorities: Zambia Environmental Management Agency (ZEMA) and Lusaka Water and Sewerage Company (LWSC)
- Eight tank business owners
- Three drivers / tank operators

We started with the problems described by these groups and then proposed a number of features that the app could offer in order to solve their challenges.

The proposed features devised or refined during the Zambia design sprint were:

- **Activity Monitoring ("tracking of operational units: truck and driver")**

Activity Monitoring allows owners to see what activities their tankers are currently engaged in, using GPS and manual input. Following feedback from the Zambia design sprint, we made minimal changes to this feature (which had previously been developed in Kenya) and further refined the driver activity input designed in Ghana. We moved from purely Truck Tracking to smart activity monitoring and prediction.

- **Alerting / Notifications**

The design sprint prompted us to include an Alerting / Notifications feature. This will alert the owner when one of their trucks is standing still for more than 10 minutes without being at the treatment site or serving a customer. This will help owners have more control without needing to constantly check in on drivers. The alerting is designed to alert

when activities are not going as expected or when operating units are potentially doing things that are not expected.

- **Customer Data Capturing**

The design sprint in Zambia prompted us to make the process of customer data entry more straightforward and to offer incentives to drivers to encourage them to add the data into the app accurately. Both the Pula development team and business owners felt this feature was important to get right, as knowing details such as customer address, size of pit and type of job is crucial in terms of both managing customers and assigning orders effectively – two further features that are facilitated by accurate customer data capturing.

- **Order Assignment**

This new feature, devised during the design sprint process, takes data from the Customer Data Capturing feature and allows owners to digitally assign orders – removing the need for constant back-and-forth phone-calls. This ensures that customer data is inputted correctly and gives owners comprehensive oversight of their fleet.

- **Customer Management**

During the Zambia design sprint we fleshed out the Customer Management feature, which allows owners to reach out to existing customers to market their services. We added in notifications that alert owners of existing customers whose tanks may be due emptying services – prompting them to reach out and offer their services. Although this is currently done by manually inputting when their pit was last emptied, more sophisticated algorithms can be developed to support this feature.

- **Finances**

The Finances feature gives owners a simple overview of revenue generated. We have decided to keep this feature as simple as possible by only including revenue, not costs. This feature received very positive feedback, but we are unsure if it should be included in the MVP, as it is not an essential part of the app. It could be introduced as an in-app purchase feature.

d. **Challenges and lessons from the Zambia design sprint**

The feedback from the consulted regulators (ZEMA, NWSC and LWSC) was very positive. ZEMA, in particular, seems very interested in the app helping them to fulfil their mandate by gaining better control and oversight of faecal sludge transport and disposal.

Given the regulators' existing and ongoing challenges, we believe that a simple, regular PDF report will be more adequate in terms of providing the authorities with FSM data. Furthermore, we do not believe that the Pula development team's resources would be best utilised in the development of a complex data visual tool: there are already many suitable products on the market that are likely to be suitable for our purposes.

The vision for Pula is to serve both authorities and operators. We have found that until a large amount of data is generated (which is only the case if the majority of vacuum tankers are using Pula) the value of the app for authorities is not so much on the data. As such, there is little benefit in focusing on the dynamic dashboard; instead, it would be more constructive to focus on a tool that encourages data generation. The dashboard will be a focus for later stages of app development, subject to whether Pula generates enough data in the MVP stage.

Activity Two: Design Sprint in Maputo, Mozambique: Jan/Feb 2018

a. Background

Following the market assessment activities in Ghana and Kenya, and the design sprint in Zambia, the Pula development team spent three weeks in Maputo working on the app. The aim of was to validate our findings from Zambia, Ghana and Kenya, uncover new user insights and refine the proposed features to suit local technology and user context.

b. Summary

The design sprint in Maputo validated our findings from Zambia, Ghana and Kenya, which indicated that municipal authorities and vacuum tank businesses are interested in Pula. Much of what we discovered in overlapped with findings from other countries.

During this design sprint, the team began to design the features and application workflow, basing the app on feedback from through the design process. This stage resulted in the app becoming further simplified: we optimised the 'adding a new customer' feature; redefined what used to be the tracking feature; replaced the financial overview with a simple daily overview; and reworked the user journey of the driver version, keeping it as simple and 'edge case proof' as possible – meaning that any mistakes made can be easily rectified.

c. What we did: research, design and iteration

The Pula team spoke with vacuum tanker owners, vacuum tank drivers and authorities through workshops, interviews and discussions. We validated the current features and explored the needs, wants and limitations of each stakeholder group. We spoke with:

- Eight Government representatives
- Seven tank business owners
- Six drivers / tank operators

At the same time, we began to design the features and application workflow, basing the app on feedback and insights from the research gathered across the design sprints. This stage of the design process resulted in the following features devised or refined further:

- Fleet management

The previous design was for owners to see a live map of their trucks; however, technological constraints and a lack of reliable GPS data forced us to revisit this idea. Therefore, the Fleet Management feature has been simplified to show a simple status overview: emptying, disposing, driving to customer, driving to treatment site or idle. This will give the owner a good understanding of whether the indicated activity of the driver is accurate.

- Daily overview

Most of the businesses we spoke to had custom-made finance tools. Rather than spending time reinventing or replicating existing products, we decided to focus on the core functionality of the app. We adjusted the Finance feature to give a simple overview of the number of trips made per truck per day.

- Pula Payment Details

Previous versions did not include a method for business owners to pay for downloading and using Pula through the App. To keep the MVP as straightforward as possible, we created a

payment page that highlights instructions and a phone number connected to a mobile money account – allowing the owner to pay for the app via their phone.

- **Notifications**

Building on the Alerting / Notification feature from Zambia outcome we further designed and validated this alerting feature to become a strong tool for businesses and operators to turn side-businesses to formal businesses.

- **Refined app flow for the driver**

Through internal discussion with UX we realised the complexity of the driver app that had been designed following the Zambia sprint. We stripped the app down to its minimum, making sure it is as easy to use as possible and is edge-case proof, so users can easily rectify any mistakes made. Maps and customer detail cross-checking have been omitted to leave the necessary driver input to a minimum.

d. Challenges and lessons from the Maputo design sprint

The feedback from the owners was generally very positive, giving the development team good grounds for thinking the Pula venture will be a success. However, we appreciate that implementing a new business tool like Pula comes with challenges – including changes to workflow and processes, which require institutional and organisational change. As such, predicting the rate of uptake among potential user groups remains difficult and complex. Once we test the MVP in August we will have more clarity on this and better insights on how to improve the app further.

Given this uncertainty on uptake it is difficult to set a price point and use this to create a reliable business model. Different price points have significant implications on customers that are needed to reach profitability.

Activity Three: Coding phase, Maputo: February 2018 – present

We are currently in the coding phase to create a functional Beta App.

a. Kick Off: February – March 2018

This phase will provide all the necessary tools and systems for the App to be coded.

- Final app prototype
- Tools research, assessment, choice and adoption;
- General System Architecture design and adjustments;
- Base server setup (will host system and server-side components);
- Communication channel setup (to provide intercommunication between App and Web Server);
- Database Schema design, adjustments, developing.

b. Mobile App Development: March 2018 – June 2018

This phase will involve all features coded to the specification detailed by design sprints and validation; component integration, testing and refinement. The result of this will be a functional Beta App.

c. Environment replication and go-live: June 2018

During this phase, we will launch Pula and to get live feedback from drivers and vacuum tank operators. The result of this will be a Functional Version 1.0.

Next Steps: from April 2018 onwards

a. Continuation of coding phase: April – September 2018

We will continue developing the App until June, when we will carry out an environmental replication and go-live to begin receiving real feedback on the app and improve to rapid iterations with the development team. Our philosophy for PULA: always in Beta. Instead of doing big releases, we plan for a incremental small update and release approach as adopted by all SAAS and app service providers.

b. Testing in Mozambique and Zambia (June – August 2018)

We will test the App in three phases: a set-up phase, to ensure the App is functional; a testing phase to ensure the App is being used effectively; and a feedback phase, comprised of meetings and workshops to ensure that Pula meets the needs of all client groups.

c. What next?

Throughout April till the end of the VIA Water funded project we will be looking for investors and further grants to scale up Pula and set up an independent business.

BoPInc presented PULA at SeedStars Africa. BoP has introduced PULA @ NEXUS in South Africa with several investors potentially interested, yet all find PULA to early stage. WSUP and BoPInc engaged with GSMA and the Toiletboard accelerator. GSMA has interest as soon as PULA can demonstrate early stage revenues, yet given the niche of the service they also are clear that the interest in the GSMA programs might be more in favour of apps and services that are targeting consumer markets at mass. Toiletboard will closely monitor.

Business Model

Who is the customer?

Service Providers in emptying and transportation of toilet resources are PULA's core customers, the one that are willing and able to pay for PULA.

Data only becomes relevant to the authorities (including municipalities, non-governmental and governmental organisations, and planning authorities) once a certain percentage of vacuum tankers are using the app. Hence, we have developed a business model that focuses on the owners for the first few years.

For municipalities to put legislation in place that would make Pula mandatory for all operational vacuum tankers (as suggested by government representatives), the app needs to be tested and run over a set period to ensure proper functionality. The Pula team recognises that putting legislation into place is often time-intensive and needs to come with the necessary enabling enforcement mechanisms. Furthermore, it needs to be acknowledged that municipalities are generally short of money making them a tricky customer.

Given this, Pula focuses on the Vacuum tank operators as customer.

How much will be charged?

Focusing on vacuum tank owners, rather than non-governmental organisations and authorities as well, comes with its challenges – the main one being how much can be charged for Pula.

During the beta testing of the app we will get further clarity on willingness to pay which will inform the business model. Current validated assumptions across the Markets show that business are willing to pay easily 30-50 usd per month. In this they compare PULA to replace their manual practices for customer management, assignments, managing payments and have a better alternative to truck tracking. We found that businesses are willing to pay more when they have more assignments. In order for PULA to be available for very small businesses (even manual) we have defined the revenue model based on m3 emptied and transported. This implies that on average service providers will pay between $1-$2 per assignment.

The business model will be further refined following live testing and feedback from users.

Gender mainstreaming in project activities

As project activities are primarily targeted at vacuum tanker operators and municipalities, opportunities to mainstream gender inclusion in project design are limited. From our experience of working with Client A and B in Mozambique and Zambia during other projects, we know that the majority of representatives are male, which will make this challenging.

However, we have endeavoured to consult with representatives from both genders during the process wherever possible.

Women are represented in WSUP's workforce in both Mozambique and Zambia, including the WSUP Zambia Business Lead, who is central to the implementation of this project. We recognise that WASH projects are far more likely to be successful if they the views of often under-represented groups at the heart of the process throughout and will strive to do this as far as possible.

Learning from others belonging to the VIA Water community

Leaning from other projects/innovations in the VIA Water community

We have participated in various VIA Water Mozambique events and have met with the Mozambique project owners. We have also met and exchanged thoughts with Xavier Gras who works on a similar initiative to Pula in Mali. The meeting showed that we are using slightly different approaches and technology and has encouraged the Pula team to rethink of the complexity of Pula's current application.

What it means for us to be part of a community like VIA Water

The meeting we attended in Maputo showed the wide range of projects VIA Water supports, something which is inspiring and thought provoking for our team. VIA Water in Mozambique, through its partnership with PLAMA and network in the water & sanitation sector, contributes to the visibility of Pula in Mozambique. This strong position of influence will undoubtedly contribute to the success of Pula when introduced across Mozambique.

How we have used knowledge in the community to enrich our ideas and how this links to our learning agenda/inception report

While many initiatives in the community have been inspiring, the most relevant exchange in this period was with Xavier Gras. It was great to see that a similar initiative to Pula has been picked up in Mali.

Pula's lessons learned during the design process and preparing for a soft-launch show that the market interest in Pula is high. Businesses, authorities and other stakeholders are asking for the introduction of the service. Data and insights and our approach to transparent reporting of businesses is one that resonates well.

Since December we are pitching Pula to early-stage investors and angel-investors. The feedback has been constructive: great initiative yet brings in the first revenues and retention management on customers and we are more than interested in exploring a potential investment. As a result, the Pula team is preparing and engaging in calls and soft-funding opportunities.

A next step in this will be to see how we can engage with VIA Water to help develop the next phase of Pula. By November 1st, 2018, the Pula MVP will be validated in Mozambique and Zambia and by this date, we should be able to smoothly step into the next phase. Funding will therefore need to be secured for this next phase before November 1st, 2018. This might be conditional on the results of the current MVP development and validation in partnership with VIA Water.

Learning about our own identity, being and acting as an entrepreneur

The transformation into becoming a (social) entrepreneur

An entrepreneurial spirit has been part of Pula ever since the first Bill and Melinda Gates Foundation (BMGF)-funded phase. Pula is developed by 3 partners and a team that has launched (digital) businesses before. The Pula team is investing their own time and money besides the support and funding that is provided through the partners and VIA Water. There is a strong drive to ensure the Pula venture is materialising in which the project team will drive Pula to the future as another platform in short history of UX as platform incubator with partners and a team of Pula.

How being part of the VIA Water programme is transforming us into real (social) entrepreneurs

The VIA Water funds have allowed us to take our idea in the *blueprint* phase to the *validate* phase. Furthermore, the partners and team are ensuring that Pula is not just a project but a business under development in which the team ensures continuity of Pula. VIA Water is the enabler for this to happen.

How we apply our learning

We have learned a lot since the beginning of the project. We have evolved as a team and are becoming more and more efficient in iterating our product and business model.

Suggestions to VIA Water

Feedback for the programme office to improve VIA Water

VIA Water is a programme that addresses a key need: innovations in water and sanitation. VIA Water might not be unique in this, but the projects that VIA Water is selecting for support (early stage, higher risk and even in ideation stage) positions the fund uniquely.

Our experience in Mozambique has shown that the offline community mobilisation and networking in the sector is very valuable. The online platform and AKVO seem not to be visited by the key stakeholders for which the innovations might hold potential. Visibility of the innovations to investors, other funding opportunities, key stakeholders and potential partners is a key element for the success of innovations (assuming an innovation proves feasible and viable).

As mentioned above, we want to engage with VIA Water to already prepare for the next phase and understand how VIA Water can best support us in this. Most of the innovations in VIA Water will require additional soft-funding or very patient capital. Despite initial investment in Pula, promising innovations require significant further investment to bridge a pioneer gap to take the project from validation stage to preparation for scaling.

Recommendations on how to improve the VIA Water programme to make Pula a success

The events that VIA Water has been organising in Mozambique are very valuable. A global event focused on pitching the innovations to relevant actors that hold potential for partnerships and/or funding would be interesting.

VIA Water has been a partner from the first day we pitched the idea and it has been instrumental in shaping Pula to where it is today. That level of interaction and partnership is something to continue and is one of the key differentiators for VIA Water.

We value open innovation and sharing. Yet an initiative like Pula struggles to gain the recognition and attention that other new pit latrine technologies are getting. The scaling and replication of Pula versus sanitation approaches like black soldier fly are vastly different and therefore the way the innovations should share and engage in open communities is different.

App development and coding phase

Pula development & system testing is reaching finalisation June. MVP user testing and pre-launch acceptance is planned for June, a user engaged testing in July aiming to do MVP launch for testing in August in Mozambique and Zambia end of August / September.

During iterative development and testing, innovative solutions have been found to ensure the MVP will contain the key features overcoming the challenges of devices and network available in the local markets.

Financial savings for FSM operators

[THE FOLLOWING INFORMATION IS NOT TO BE SHARED WITH THE PUBLIC - contains some elements of the unique value proposition]

What do you anticipate that the expected financial savings will be for FSM operators in terms of using Pula, rather than the GPS tracking / calling up systems they are currently using?

Pula's ROI compared to ROI on asset tracking will prove to be much higher. GPS tracking is not providing savings to businesses as it adds to costs of controlling assets and can only see whether trucks are moving or not, still not knowing what the trucks are doing.

Pula's unique selling point is not purely a tracking tool to locate assets. As such, we would like to avoid this comparison. Pula supports service provider and operators to manage customers and their assignments. Pula signals the service provider if the operator (truck) seems to be doing something that is not aligned with what he should be doing. Not only can the owner then have an idea of where assets are, but he knows the status of activities and is made aware if operations are deviating from what is expected. Through this clear overview of the movements of trucks/operators, the business owner does not need to constantly monitor and can instead focus on other tasks such as customer management.

Besides this, Pula's value resides in proper customer management, assignment management, asset management, transparency of executed assignments (needed for license reporting), revenue management and have data and information improving bankability. We are even exploring a partnership with 2 innovative SME lending platforms to businesses, we want to be ready for the future.

At the end of each day, the business owner will get a daily overview of the work a vacuum tanker has carried out. This will help with financial planning and business optimisation. Owners will get notifications of when a septic tank of a client that they have served before will be full. This will ensure that they are not losing customers and allows them to offer pre-emptive emptying services.

Current Financial Situation

Is the project budget being spent according to the planning?
Yes

Are changes in the project affecting the current budget? If so, how do you propose to mitigate this?
There are no changes to note. In fact, the project team is putting in more time than planned into the project, as well as their own free time.

Partnership between direct project partners

How we cooperate and any changes in set-up and learnings

The core team of Pula is a consistent team, representing the partners WSUP, BoPInc and UX and set-up as a leadership team to take Pula forward. Governance and management of Pula is done through regular tactical sessions. Pula as a platform is being developed with UX as the platform development partner that is ensuring that the assigned team of

designers, developers (front-end/back-end) are engaged in the Pula team. The partnership with WSUP and mobilizing of WSUP teams in the countries has been crucial as an extended market insight and market engagement team for Pula. This will prove to be valuable when introducing the MVP. We have even requests from the original Pula-teams in Ghana and Kenya to make the MVP available as quickly as possible.

For the future we see the project partners taking Pula to a venture (Q3 2018) and remain strategic partners and co-owners of Pula (except for WSUP that wants to remain partner and advisor to Pula only).

Stakeholder relations

Over the course of the project, we have always been closely engaged with the stakeholders. Using a human-centred design approach, our stakeholders are at the core of our development process. In our design sprints in Mozambique and Zambia, we have conducted qualitative research with all relevant parties. This research has directly informed the design of the application. We have been building relationships, engaging drivers, owners, regulators and authorities in Lusaka and Maputo.

We are planning an intensive session with AIAS on how Pula can be instrumental to address the uncertain emptying demand in the 130 towns of AIAS. With the investments in public sanitation and upgrade of houses in key cities and towns around Mozambique, there is an interest in ensuring data collection and services are supported with key services.

In June we will inform all our stakeholders in all markets (Kenya, Ghana, Mozambique and Lusaka) on where we stand with Pula and make them aware of our website: www.getpula.com and keep them engaged and informed.