Mobile for Development Utilities

Development Workshop Angola: Missed Calls for Monitoring Community Water Services

Mobile for Development Utilities

The Innovation Fund

The Mobile for Development Utilities Innovation Fund was launched in June 2013 to test and scale the use of mobile to improve or increase access to energy, water and sanitation services. In two phases of funding, grants were competitively awarded to 34 organisations across Asia and Africa. Seed grants were awarded for early stage trials, Market Validation grants for scaling or replication of business models, and Utility Partnership grants to foster partnerships between utility companies and innovators.

The specific objective of the Innovation Fund is to extract insights from the trial and scaling of these innovative models to inform three key questions for growing the sector:

• How can mobile support utility services?

• For a mobile-enabled solution to be adopted at scale, what building blocks are needed?

• What are the social and commercial impacts of delivering community services to underserved mobile subscribers?

These insights, as well as grant-specific learning objectives, are included in individual case studies such as this one, as well as thematic reports that will be published throughout 2015 and 2016.

CONTENTS

Executive Summary

In January 2014, the Mobile for Development Utilities Programme awarded the non-governmental organisation (NGO) Development Workshop Angola (DW) a Seed grant to trial VerAgua, a programme for mobile-based monitoring of community water points in the informal settlements of Huambo, Angola. The majority of the city's community water points are handpumps while others are solar-powered boreholes and taps from the city network. All provide unreliable service due to breakages or limited supply. The Provincial Authority of Energy and Water of Huambo (DPEAH) and the Water and Sanitary Company (EPAS) are responsible for these services, with support from organisations like DW. However, they lack a monitoring system to know when repairs or new infrastructure are needed. To address this, DW and their technology partner SeeSaw developed the VerAgua programme. This includes SeeTell, a system for water point caretakers to report water service status by making free 'missed calls' to different numbers corresponding to variable status, and SeeView, a mobile application for field staff to view and update the water point status in the database.

The grant tested the use of these mobile tools to provide reliable information about water service points, which would raise the Government's awareness of poor service levels and drive a "consumer conscience" to demand better services, thereby creating accountability to rapidly improve service to the underserved. The proposed business model was to have DPEAH pay for the monitoring platform that enables them to better manage services. DW and SeeSaw tested this through a pilot of 120 water points in Huambo. The key findings include the following:

- **Water point caretakers do not reliably report water status when other factors outweigh incentives.** Caretakers who reported regularly were rewarded with entry into a monthly lottery for free airtime. However, from August 2014 to March 2016, only 79 out of the registered 120 caretakers reported (34% never reported). While caretakers were supposed to report three times a week, only 8% reported once or twice a week, with the remainder reporting extremely infrequently or not at all. The limited reporting rates resulted from several factors:

  » **Caretakers become unwilling to report without repairs and confirmations**. The main deterrent for reporting was that repairs of reported water point problems took months or did not happen at all due to failed planning for repair responsibilities and financing. In some instances, caretakers thought the system was not working if they did not receive the SMS report confirmation due to problems with the mobile network or SMS provider.[1] Consequently, many caretakers did not see the value in continued reporting.

  » **Caretakers struggle to keep functioning mobile phones, particularly with high airtime costs and rapid expiration.** In Angola, missed calls do not consume airtime, yet a minimum balance of five airtime credits (UTT) or approximately USD 0.29[2] is required to initiate any call. Additionally, airtime expires if it is not used within 30 days and the minimum airtime purchase is USD 2.88.[3] Despite DW initially giving some caretakers phones with credit, caretakers struggled to maintain credit for reporting. Some did not have working phones after they were damaged, lost, sold, or power was not available to charge them.

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1. SeeSaw could not confirm that caretakers received SMS confirmations in 3% of cases, on average.
2. Mobile operators in Angola use a standard airtime credit, Unidade Tarifária de Telecomunicações , Telecommunication Tariff Units (UTT), which is worth 7.2 Kwanzas (AOA). 1 USD = 125 AOA based on the average OANDA exchange rate during August 2015 which is the approximate midway point of the pilot. At the time of writing in April 2016 however, the value of the Kwanza had dropped to 1 USD = 165 AOA.
3. This smallest top-up is only available at machines (not scratch cards) for one of the operators (Unitel), while the other (Movicel) has a smallest top-up value of 450 Kwanza or about 3.6 USD.

» **Caretaker responsibilities shift and communities use alternative water points without DW's knowledge.** Caretakers sometimes delegated their roles to others but failed to explain reporting responsibilities to their replacement or notify DW of the change. Caretakers would also stop reporting on some of the water points that were not in use during the rainy season when shallow household wells provided a free and convenient water source.

DW attempted to address these issues with more frequent in-person follow-ups with caretakers to retrain them, reiterate the value of reporting and reassign reporting responsibilities. This, however, demanded more time and resources from DW than expected. Moreover, DW lacked sufficient in-house technical expertise to manage small changes to the system and depended on remote support from SeeSaw.

• **Simplicity in caretaker reporting is key, but the trade-off is limited information.** The SeeTell platform used missed calls to be quick and easy for caretakers. Missed calls were made to numbers that each corresponded to a different service status. The pilot initially tested different reporting metrics for each of the three types of water points. Reporting water service as "on" or "off," and reporting hours of service did not make sense for handpumps, which are only pumped periodically, and faced other challenges. The reporting carried forward was simplified to three options - functional, partially functional, or non-functional - after removing a fourth option for water quality, and the required frequency was reduced from daily to three times per week. This kept reporting simple for caretakers; however, at the same time, reports only indicated the possible need for repair, yielding limited information on hours of service or the issue.

• **Ambiguous policies and opaque financing for maintenance hinder the impact of monitoring. Households make water payments to the caretaker and EPAS takes a portion of this for general maintenance**. However, these payments and EPAS' collection are variable and not recorded, and sometimes caretakers directly use this money for small repairs. Furthermore, EPAS revenue goes to general budgets within the Provincial Government and are not reserved for maintenance of water points. As a result, funds have not been readily available for repairs, even though the mobile-based monitoring solution has added somewhat more visibility into where repairs are needed.

• **Government financing or an interim solution for repairs is required at the outset to sustain caretaker engagement and demonstrate the impact of monitoring.** The pilot aimed to use water status reports to advocate for the Government to improve water services. However, this meant caretakers were reporting problems before there was a solution or financing in place to make repairs. As a result, the caretakers quickly lost interest. Ultimately, DW had to finance spare parts and labour to demonstrate the value of reporting although there have been ongoing discussions about Government financing and EPAS has contributed some labour. Therefore, future deployments must include an immediate maintenance solution.

These findings highlight the challenges of water point caretakers reporting service status and the difficulty in using monitoring to drive government to improve services without an interim solution for financing maintenance either by government or a third party. Although DW and SeeSaw made efforts to address challenges, the VerAgua programme in Huambo was ultimately reduced by half to just 68 caretakers in January 2016. Nonetheless, the Luanda Government (the capital city) has shown continued interest in VerAgua and is now supporting the replication of the services there, with the lessons learned from this pilot leading to improved design and implementation. Implementation in Luanda began in August 2015 for reporting on the status of the city's network of community water points. To date, caretakers have reported more regularly and funds have been made available for timely repairs.

Introduction

Development Workshop Angola (DW) has been working in Angolan civil society since 1981. DW works alongside the Angolan Government to support decentralisation, with a focus on improving the provision of basic services, developing community economies and rehabilitating social infrastructure and settlement following Angola's civil war. Through DW's development of a community management model for water points (referred to locally as MOJECA), DW identified the need for monitoring water services to establish accountability between the Government and communities to drive improved services.

Background on Huambo's Water Services

Water services and policies in Huambo are the responsibility of the Provincial Authority for Water and Energy (DPEAH), which oversees the Huambo Water and Sanitary Company (EPAS), a government entity responsible for implementing and maintaining infrastructure. This includes the limited piped water network that directly connects 30% of the population, while another 30% is served by community water points. The remainder of the population relies on informal water resellers and unimproved shallow wells at some households.

The approximately 300 community water points in Huambo are made up of three different types of systems as depicted in Figure 1, with the large majority being wells with handpumps.

FIGURE 1

Different types of community water points in Huambo

Wells with manual handpumps such as the AfriDev pump shown here

Solar powered boreholes that pump water from the ground into storage tanks

Taps from the city water network

DW previously constructed many of these water points with financing from the Government and international donors, and has established community management associations[4] at 230 of the water points. The management associations include the caretaker who opens and closes the water point and oversees collection of payments and general operations, as well as a treasurer. The associations collect payments from each household. The payment amount varies by community, seasonality and whether households use water for domestic consumption only or for laundry as well. On average, a caretaker might collect 5,000 Kwanzas (USD 40) a month, retaining about 15% (USD 6) for salary while the remainder is intended for DPEAH/EPAS to pay for the bulk supply of water in the case of taps and for general maintenance of all water points.

Need for improved Water Services

Water supply from the community water points is unreliable; the piped network is intermittent with low pressure and all systems suffer from breakages or stolen parts. This forces people to either rely on informal water vendors selling water at prices inflated by 10-15 times the normal price, according to DW's observations, or use unsafe sources. Due to a lack of human resources and funds, DPEAH/EPAS do not collect information about water service status at community water points and do not have regular maintenance operations. Nor do they have oversight on the performance of community management and their collection of payments.

Key Facts about Development Workshop Angola

FIGURE 2

Organisation overview as of December 2014

Name	Development Workshop Angola
Sector	Water services, with broader focus on economic and social development
Year Established	1981
Country Footprint	Angola
Service	Water point monitoring via caretaker reporting through missed calls and mobile application to support field investigations (software developed and operated by partner SeeSaw).
Market Segment	Informal settlements relying on community water points in urban and peri-urban Huambo.
Total Systems/ Customers Served	120 water point caretakers trained with each water point serving approximately 700 people; however, a maximum of 79 caretakers carried out reporting at least once.
Use of Mobile: Technology and Partnership	• Missed calls to different numbers indicate variable water status at designated water point • SMS sent to caretakers to prompt reporting, confirm received reports, and communicate about the lottery • Mobile application for DWA staff to review recent reports and update water point status while in the field • No partnership with a mobile network operator; however, DW awarded mobile airtime through a lottery to caretakers who reported regularly

4.   Locally referred to as "GAS" based on a Portuguese acronym

FIGURE 3

DW's water-related work in Angola

DW established community managed water points in the municipalities of Cachiungo (Huambo) and Chinguar (Bié)
2013

DW and SeeSaw replicated the VerAgua programme in Luanda
2015

| 2011 | 2013 | 2014 | 2015 |

DW worked with partners to install water systems equipped with solar panels managed under the MOJECA framework
2011

DW implemented this pilot for monitoring 120 water points in Huambo using mobile technology
2014

Pilot Objectives

The objectives of Development Workshop Angola's Seed grant were to firstly trial a system of free missed calls and a mobile field application to monitor water services. Secondly, the pilot sought to test if the reported information could lead to improved water services by giving DPEAH/EPAS the real-time information needed to promptly make repairs and the evidence needed to allocate more resources toward maintaining water infrastructure, while also enabling water users and NGOs to advocate for better services.

The expected lessons to inform the broader water sector, as defined by DW and SeeSaw at the outset of the pilot included:

• The potential for mobile reporting of service delivery issues in low-income areas to lead to service improvements for attainment of the Millennium Development Goals.

• The role of airtime to incentivise reliable reporting.

• The potential for field-level, real-time information to empower water users, an NGO, and government to demand and deliver improved services by bringing attention to informal settlements and poor communities.

• The extent to which poor communities are both willing and able to pay for services and how this can lead to informal settlements being mainstreamed within normal municipal service provision.

• The testing of a business model of creating value from data on water services that governments and/ or NGOs are willing to support financially.

Market Opportunity

Addressable Market

The market opportunity for DW and SeeSaw's service is characterised by Angola's low rate of access to piped water services and high dependence on other improved sources.[5] For example, handpump usage is 34% nationally, 43% in urban areas and 26% in rural areas.[6] This means about 7.5 million people, out of the total population of 22 million,[7] rely on improved sources that are not piped to premises, with the majority of those being in urban areas. However, if these sources are unreliable, as seen in Huambo, even those considered to have "improved access" are forced to rely on unsafe or distant alternative sources.

By contrast, over 60% of the population has access to GSM networks.[8] This means about 20%, or 4.5 million people, are within the addressable market that has access to communal water sources considered to be "improved" and are covered by GSM networks which could be leveraged for monitoring to ensure reliable services. This pilot targeted urban and peri-urban areas that depend on improved community water sources; however, there could be a potential to trial this service in rural areas as well.

Mobile Ecosystem

The Angolan mobile ecosystem is still nascent in terms of mobile services, yet Angola's penetration of unique subscribers, at 39% of the population, is on par with the Middle Africa[9] regional rate of 34%.[10] Of the two mobile operators in Angola, Unitel is currently the mobile market leader, with a market share of 71-73% in 2015.[11] Neither Unitel nor Movicel offer mobile money deployments at present; however, in late 2014, the Angolan Investment Bank (BAI) launched a mobile money service that can be used with either operator.

Market Assumptions

As outlined in their grant proposal, DW and SeeSaw launched their service in Huambo based on the following assumptions:

- The 70% of people who rely on communal water sources live near or below the poverty line.

- Community water points will remain the most equitable and cost-effective service.

- Consumers at public water points typically pay a rate of 25 Kwansas (USD 0.20) for 1000 litres of water.

- DPEAH/EPAS take the majority of water revenue collected by the caretakers to cover their bulk supply and maintenance services; the remainder is used to remunerate caretakers for their service.

- DPEAH/EPAS deprioritise supply to informal settlements in favour of household connections because the community water points are not metered to support revenue collection.

- DPEAH/EPAS seek to improve their financial sustainability and require monitoring of services in order to improve them and be able to collect more of their expected revenue.

- The vast majority (90%) of the population in Huambo has access to mobile phones and network coverage is 100% between both Unitel and Movicel.

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5. The WHO/UNICEF Joint Monitoring Programme specifies improved and unimproved sources as follows: "An improved drinking water source is one that, by the nature of its construction, adequately protects the source from outside contamination, particularly faecal matter." A full list of sources considered improved and unimproved can be found here: http://www.wssinfo.org/definitions-methods/watsan-categories/

6. WHO/UNICEF Joint Monitoring Programme, 2015 Update: http://www.wssinfo.org/

7. World bank Data Bank, 2014 http://data.worldbank.org/country/Angola

8. GSMA Intelligence Data for 2015 Q2.

9. A grouping that includes Angola, Cameroon, Central African republic, Chad, Congo, Democratic Republic of Congo, Equatorial Guinea, Gabon, Sao Tomé and Principe.

10. GSMA Intelligence, Data for 2015 Q2.

11. GSMA Intelligence, Data for 2014 Q2 – 2015 Q1.

Business Model

Value Proposition

VerAgua's proposed business model would create value for DPEAH/EPAS by providing timely information on which water points have been operating in order to maintain reliable supply and yield revenue. Indeed, DPEAH should draw more revenue through providing reliable service to more customers, making the organisation more financially sustainable and less dependent on national Government subsidies. Therefore, DW and SeeSaw proposed to eventually charge DPEAH/EPAS a fee for the information service based on the number of water points benefiting from it.

Service and Pricing

DW and SeeSaw's monitoring service to DPEAH/EPAS included the following components during the grant period:

- **Baseline status of water points**. DW carried out a baseline functionality survey for 289 water points in Huambo and discussed the results with DPEAH/EPAS.

- **Status reports to the Government.** DW sent a monthly report to DPEAH/EPAS, which summarised the weekly status of each water point, and met to discuss the level of reporting and need for repairs. The content and frequency of this report was developed through early input from DPEAH/EPAS.

- **Repair of water points.** Maintenance of water points is the responsibility of DPEAH to fund and EPAS to implement. However, DW found it necessary during the pilot to initiate maintenance in order to demonstrate to all stakeholders the value of the monitoring service (see results section for more information).

It was expected that the Government would not pay for the monitoring platform during the pilot, but would eventually pay for the service on a per water point basis following successful demonstration of its added value. The anticipated pricing was based on the number of water points and was between USD 5-15 per annum per water point, for between 2,000 and 10,000 water points.

Use of Mobile: Technology and Partnership

Technology: The VerAgua programme is based on SeeSaw's SeeTell and SeeView platforms which utilise mobile services (specifically free missed calls, SMS and data) to relay information about water service status. This is described in more detail in the operations section below.

Partnership with a Mobile Operator: SeeSaw designed the missed call platform to receive calls from both Unitel and Movicel. No formal partnership with a mobile operator was created for this pilot.

Operations

The VerAgua programme was built on two integrated platforms which operated as follows:

SeeTell:

1. Caretakers were given laminated cards (see Figure 4) with unique phone numbers that correspond to their specific water point. Caretakers' own phone numbers were also assigned to their water point in the database. This allowed the SeeTell platform to associate the missed calls to specific water points and for DW to contact the caretakers assigned to each point.

2. An SMS was sent to caretakers on the morning of each of their three reporting days per week to prompt them to report the water status.

3. Caretakers made the following two reports by placing a missed call to the number on the card that corresponds to the correct status:

   » Report 1: Water point functionality (functional, partially functional, or non-functional).

   » Report 2: Weather (sunny, cloudy, or rainy). The purpose of this report is to validate caretakers' understanding (see results section).

4. Within 20 minutes, an SMS was automatically sent back to caretakers confirming the water status reported.

5. The SeeTell web platform tracked these calls to aggregate the status of all water points. SeeSaw sent DW a status report once a week showing water point status and statistics on the number of caretakers who reported in the last 15 days and those who had not reported in the last six months.

6. DW called caretakers who reported problems to understand what maintenance might be required.

7. To incentivise reporting, caretakers who reported regularly were entered into a lottery to win airtime (USD 36 and USD 7.2 for first and second place among the registered caretakers, and USD 7.2 for the winner of a lottery open to anyone reporting who was not an officially registered caretaker[12]). All caretakers were notified about the results of the lottery by SMS.

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12. DW and SeeSaw told caretakers that even if they did not have use of their own phone, others could report on their behalf using a different number. The missed call numbers specific to the water point would identify the water point in the database even if the caretaker was not registered.

FIGURE 4

Reporting instruction card for caretakers

The reporting instructions on the left are for reporting water functioning normally, functioning with some problems, or not functioning. The instructions on the the right are for reporting the weather as sunny, cloundy or rainy.

SeeView:

1. This mobile smartphone app used 3G to access the database of water point status, which was populated by missed calls through SeeTell.

2. DWA staff, and eventually Government staff, could use the app while in the field or office to verify the most recent reports and make updates, particularly after making a repair.

3. Users could look up water points in the app by a GPS search of nearby points or by a search for the water point name.

4. If the water point status updated through the SeeView app conflicted with what was reported by a caretaker through SeeTell, an e-mail was automatically sent prompting the SeeView user to delete the incorrect report and respond by e-mail.

FIGURE 5 | Source: SeeSaw

The different uses of mobile in the SeeTell/SeeView platforms

SMS PROMPTS, LOTTERY

CARETAKERS USING SeeTell → MISSED CALLS → DATABASE

SeeView USERS VERIFY INFORMATION ↔ INFORMATION CONFLICT RESOLUTION ↔ ANALYSIS

GOVERNMENT, NGO's RECEIVING REPORTS AND MAP ← REPORTS AND MAP ← SeeSawSend PLATFORM
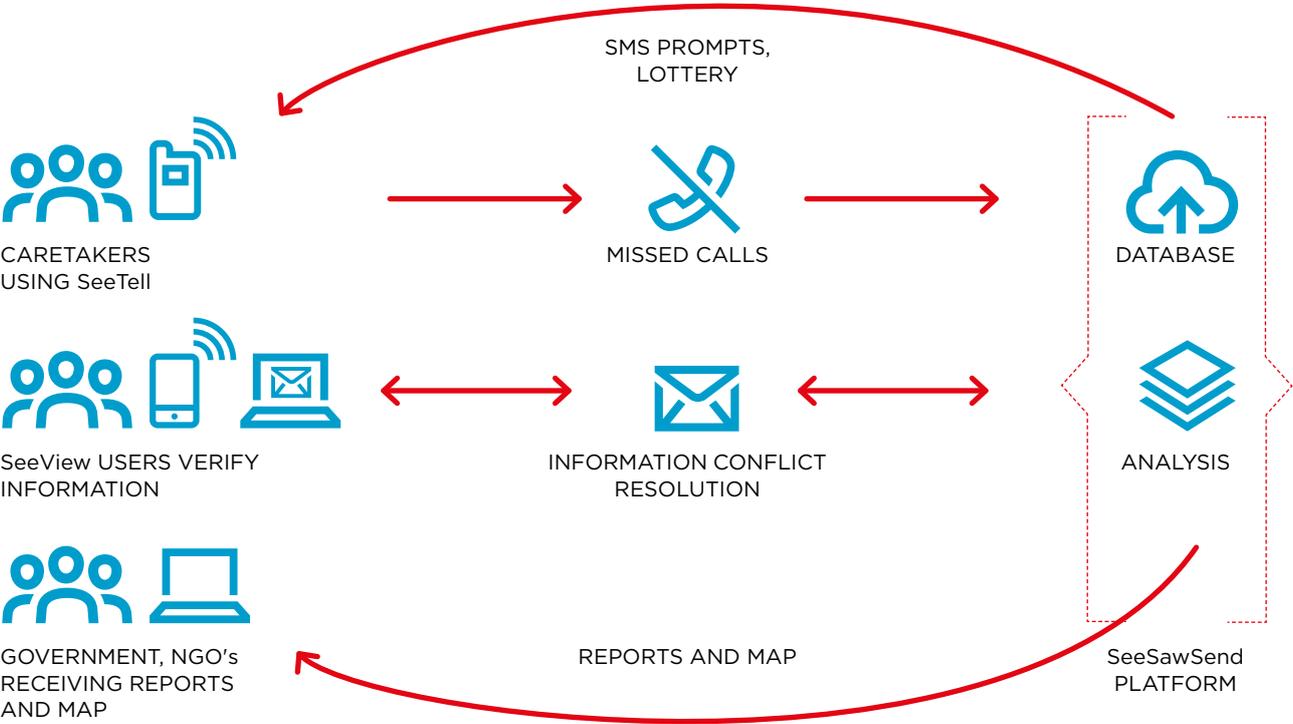
Source: GSMA

DW and SeeSaw team speak with caretakers about reporting.

Early Results

Business Model Viability

The service and business model faced challenges of limited caretaker reporting and delayed maintenance, primarily due to an absence of planning and financing for maintenance amidst implementation challenges. Despite operational refinements, the number of monitored water points was reduced from 120 to 68 in early 2016. Ultimately, the service resulted in the repair of 33 water points in total (led by and funded mostly by DW) out of the 41 that were broken at the start of the pilot and the 6 that broke during the pilot. However, repairs have been ad hoc and a streamlined process and designated finances for repairs are still lacking. While the Government has remained enthusiastic about the

programme and DW has begun to replicate the service in Luanda, it remains unclear if caretaker reporting can be sustained in Huambo and if the Government will pay for the monitoring service and the repairs.

Deployment and Adoption

During the pilot, DW trained 120 caretakers to report on 120 individual water points. The number of each type of water point is shown in Figure 6. The water points were selected from the baseline survey to ensure mobile coverage and inclusion of both water points that were functional (79) and non-functional (41).

FIGURE 6

Classification of the 120 water points selected for the trial

HANDPUMP   SOLAR BOREHOLE   NETWORK TAP
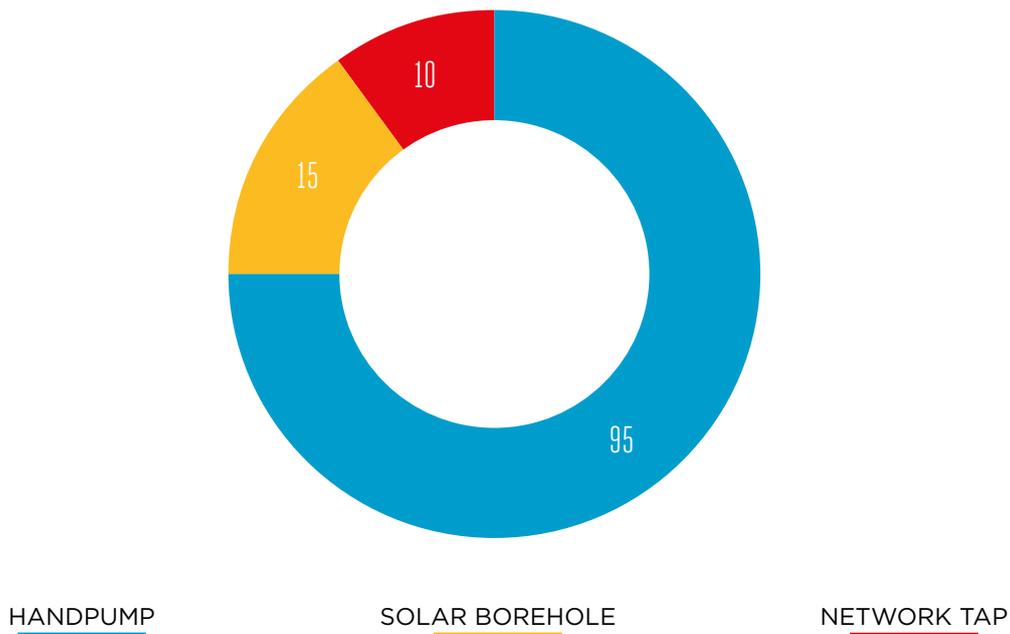
The frequency of reporting remained far lower than expected. From August 2014 to March 2016, only 79 out of the registered 120 caretakers reported at least once. While caretakers were supposed to report three times per week, only 8% reported regularly (more than two reports/week on average), 7% reported intermittently (between one and two reports/week), 50% reported extremely infrequently (less than one report/week), and the remainder, 34%, never reported. This led to a much lower number of reports per water point than the expected 12 per month, as shown in Figure 7. It also meant that the number of water points for which there was data remained less than half of the 120 each month as shown in figure 8.

FIGURE 7

Average number of reports per water point per month
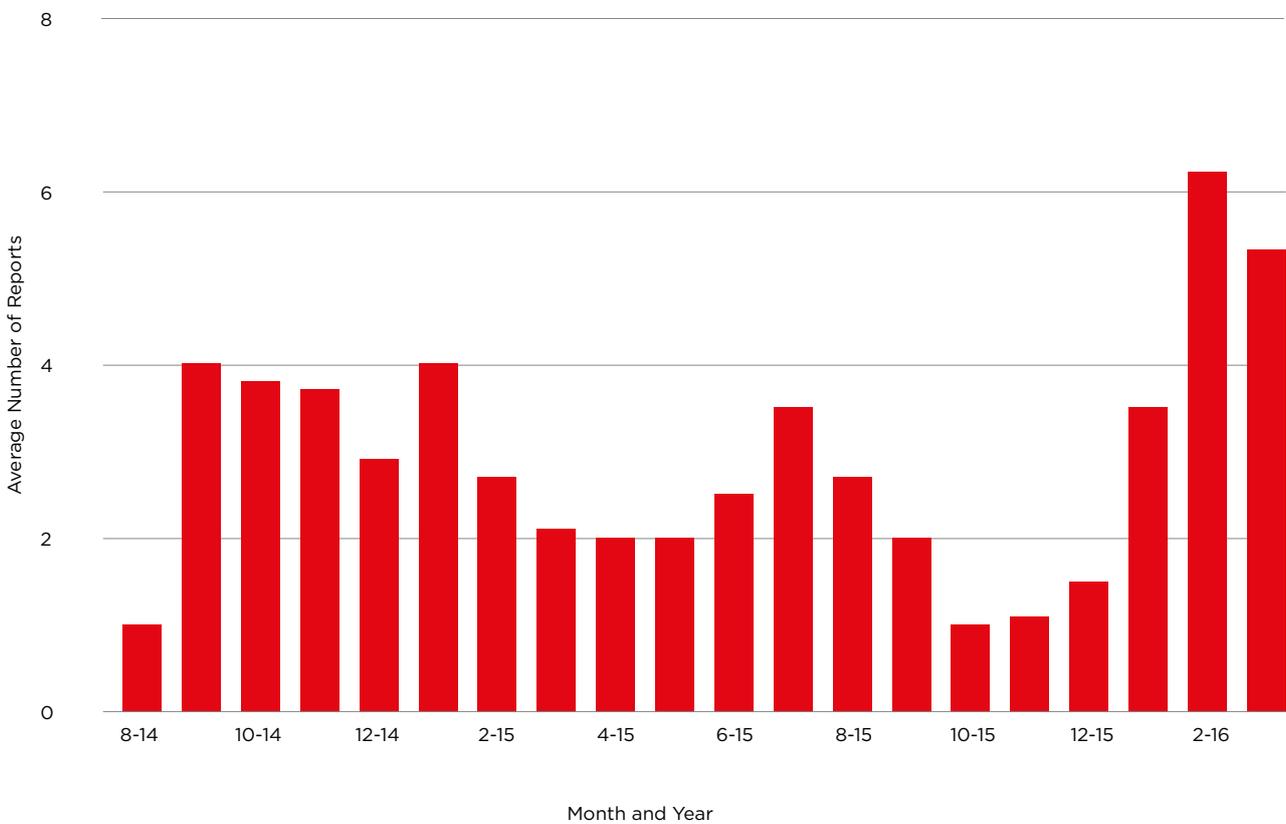
Number of water points with caretaker reports per month
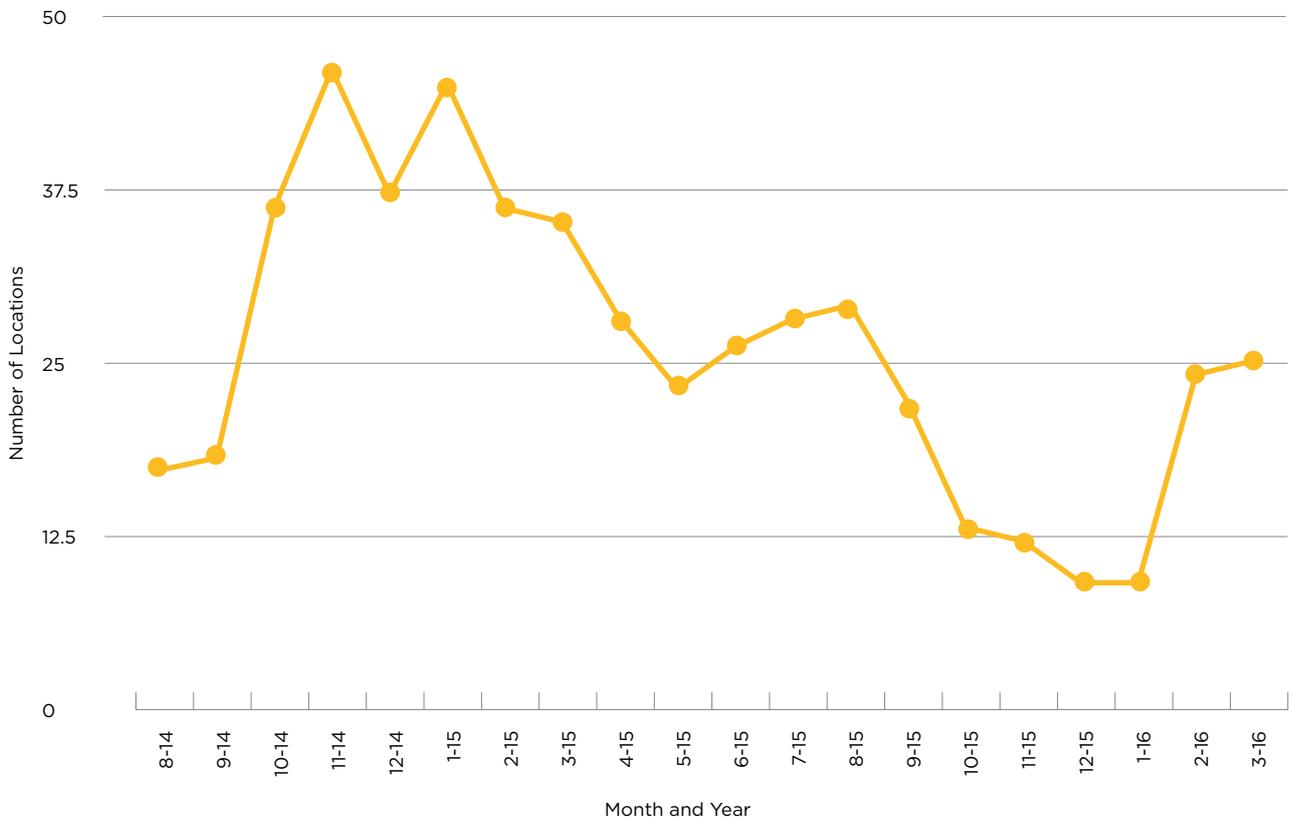
Reporting levels decreased over time, with periodic spikes when DW would retrain caretakers or reassign reporting responsibilities, such as in January and July 2015 and January 2016, as shown in Figure 9.

Source: GSMA

Taps at solar powered borehole washing station.

Number of total reports per month

Month and Year
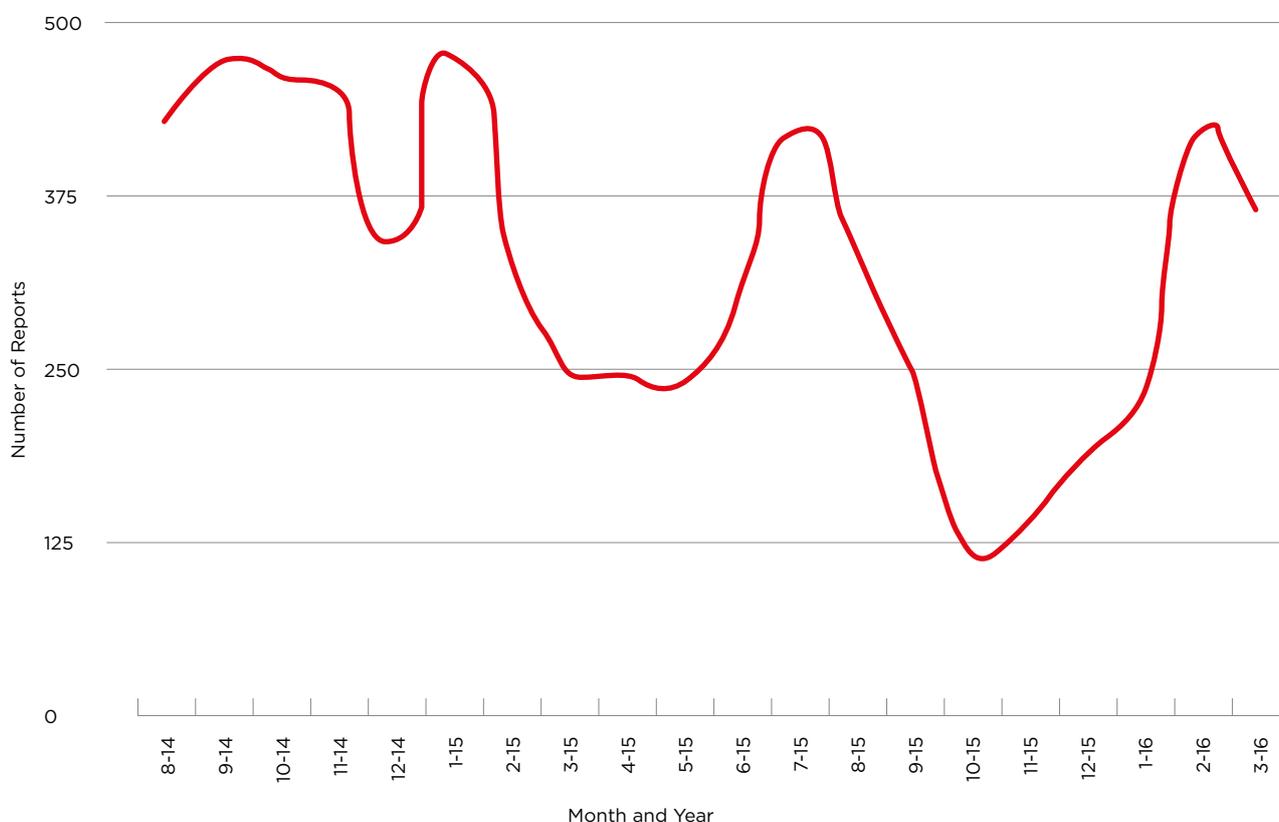
Lessons on Barriers to Reporting

Water point caretakers do not reliably report water status when other factors outweigh incentives. DW carried out a survey of caretakers to understand the reasons for limited reporting, despite the incentive of the airtime lottery, and these included the following:

Caretakers become unwilling to report without repairs and confirmations. The biggest barrier was that caretakers did not see rapid (or any) repairs in response to reported problems, due to weak planning and limited funding for making repairs (see below). Caretakers were also deterred from reporting if they did not receive an SMS confirmation.[13] In some cases, the twenty-minute delay in SMS confirmations resulted in caretakers making reports many times in sequence, possibly becoming confused or frustrated.

The high cost of airtime and rate of credit expiration can prevent caretakers from reporting. Missed calls do not use credit, yet a minimum balance of five airtime credits (UTT) or approximately USD 0.29 is required to make them. However, mobile credit expires if it is not used within 30 days and the minimum airtime purchase is USD 2.88. This undermines the ability of caretakers, typically low-income, to maintain credit for reporting. Although 46 caretakers were given phones with USD 4 of initial credit, caretakers often used all their credit for personal use.

Caretaker responsibilities may shift and alternative water points are used during the rainy season. Caretakers may temporarily or permanently delegate their roles to family or friends, take on new jobs, or become ill, yet they often fail to pass on reporting responsibilities.

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13.   SeeSaw could not confirm that caretakers received SMS confirmations in 3% of cases, on average.

Caretakers may also stop reporting if the water point goes out of use during the rainy season when shallow wells become available for free. In at least five cases, land was privatised and the water point was temporarily or permanently unavailable to the community. Caretakers typically failed to notify DW of these changes.

Lesser factors that also impacted reporting include:

» Caretakers' phones were sometimes lost, damaged, or sold, or power was not available to charge them.

» Caretakers may have needed more training than anticipated. For example, SeeSaw provided a method for caretakers to register a different phone number to the specific water point (if the original was unavailable as described above) by making three sequential calls. Yet few actually did this suggesting that more training may have been required.

» Some caretakers feared electrocution if they used their phones during lightning storms, which can occur frequently in the afternoons.

Free airtime and phones do not guarantee reporting. DW distributed free, dual-SIM, basic phones to all 30 caretakers in the initial pilot, preloaded with USD 4 credit. During subsequent trainings of new caretakers, DW distributed a further 16 phones and credit to the caretakers who did not own phones. There had been divergent opinions about the risks and benefits of giving out free phones, and the ultimate result was that reporting was still low and 11 caretakers reported their free phones as lost or stolen.

Local resources and capacity required to manage reporting were higher than anticipated. DW did not have the level of staff resources and expertise that was ultimately needed to easily manage and operate the platform locally. Seesaw is not based in Angola so providing the necessary extra support to DW was challenging and communications were difficult.[14] For example, the system requires a unique set of reporting numbers assigned to each water point, so DW's initial misunderstanding of this led to distribution of the unique instruction cards to the wrong water points and required lengthy follow-up with SeeSaw. Additionally, DW preferred to e-mail SeeSaw to notify them of changes to caretakers' reporting responsibilities rather than use the online system provided for this. Furthermore, the amount of caretaker re-training and follow-up necessitated more resourcing than anticipated.

Incorporating a mobile tool for field staff operations may take more time and training than expected. Unfortunately, DW staff did not frequently use Seesaw's SeeView application to view and edit water point status in the field. DW staff may have thought it was not possible to use it if the mobile network was not available. However, the application was designed to bring up the water point database even without network coverage, although entering corrections does require a connection. Additionally, the application was initially only in English rather than Portuguese whereas DW field staff are more confident operating in Portuguese. Thus, DW field staff were not comfortable using it or did not find it necessary. The DW staff in Luanda seem more receptive but have not started formally using SeeView yet.

Government financing or an interim solution for repairs is required at the outset to sustain caretaker engagement and demonstrate the impact of monitoring. The pilot aimed to use information about water services to increase Government awareness and build consumer conscience, thereby driving the Government to improve services. However, this meant caretakers were reporting problems before there was a plan or financing in place to make repairs and consequently, the caretakers quickly lost interest in reporting. Ultimately, DW has led on financing and implementing repairs of 33 water points in order to demonstrate to the Government and caretakers the value of monitoring. DPEAH/EPAS has made some ad-hoc contributions to repairs by providing trained mechanics to work with DW maintenance teams. Communities have also been asked on the spot to raise funds for the spare parts needed, which has in some cases delayed or prevented maintenance.

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14. Internet service in Huambo can be particularly bad with outages for several days at a time. Mobile 3G networks were also found to be somewhat unreliable. Finally, a limited number of DW and SeeSaw staff are strong in both English and Portuguese, limiting the flow of information through a few people.

Refinements to Operations

Identifying the Best Information to Report

DW and SeeSaw initially trained a group of 30 caretakers to test different reporting metrics for the different types of water points in order to make iterative improvements before launching the full pilot with 120 caretakers. The different reporting trials are explained in Figure 10, followed by the key findings.

FIGURE 10

Trials of reporting three different water point metrics

	Functionality reporting	On/Off reporting	Hours of service reporting
Description of reporting instructions (see Appendix for instruction cards)	Missed call to one number: **1.** water supply is normal, **2.** water is flowing but irregularly, **3.** water quality is poor, or **4.** no water is flowing	Missed call to one number: **1.** water is on **2.** water is off	Missed call to one of 10 numbers, each of which corresponds to a different number of functional hours (0-9)
Number & type of water points trialled on	10 handpumps	5 solar boreholes, 5 network taps	5 solar boreholes, 5 network taps
Intended frequency of report	As often as necessary for status changes	As often as necessary for status changes	Once at the end of each day

Service design depends on context and user behaviour; simple reporting is key, but the trade-off is limited information. This initial trial demonstrated that reporting hours of service or whether the water was on or off are less relevant for handpumps, which are pumped intermittently. Furthermore, reporting whether the water is on or off requires more than one missed call to correlate this with when caretakers opened and closed the water point each day in order to estimate hours of service. This proved difficult given the low willingness to report. Additionally, reporting the hours of service directly was found to be too complex because SMS prompts were sent in the morning and caretakers might not have accurately remembered the hours for the previous day or the responsibilities might have been delegated. Consequently, the reporting was simplified to three functionality options: functional, partially functional or non-functional (removing the option for water quality problems).[15] This information provides an indication that a water point may have a problem but less detail than originally hoped. DW therefore calls the water point caretakers to ask more questions about the problems and may make a site visit.

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15. However, the first group of 30 caretakers continued with their originally assigned reporting to avoid confusion.

Validating caretaker understanding with weather as an objective report can pose challenges.

In addition to water status reports, all caretakers were required to report the weather to demonstrate their understanding of the reporting process by reporting something fairly objective, and also to reinforce the habit of reporting (see instruction card below). However, Huambo's daily weather stays fairly consistent during some seasons, and at other times it varies dramatically depending on the time of day (e.g. afternoon thunderstorms). Therefore, weather reporting did not provide clear validation of caretaker understanding. SeeSaw continues to use weather reporting as a form of practice for caretakers but is considering other information to be reported instead of the weather.

AVIAÇÃO ZONA C

1. Escolha uma imagem quedescreve o tempo hoje

2. Disque o número ao lado dele

3. Deixe o telefone tocar três vezes, então parar a chamada desligando [Se você ouvir um tom de chamada em seguida, um tom de ocupado, que também é bom, apenas desligue]

See Tell ™

SOL
0027 21 202 5266

NUVEM
0027 21 202 5267

CHUVA
0027 21 202 5268

info@greenseesaw.com

Addressing Low Reporting Rates

In response to the low reporting frequencies described above, DW and SeeSaw implemented the following technical and operational changes; however, these did not dramatically improve reporting.

Technical changes to the platform:

- Caretakers receive an SMS to prompt reporting on their assigned days.

- Caretakers can register a new number for their specific water point by calling all three weather reporting options (unique for the water point) in sequence from the new number.

- Caretakers can make a free missed call to a DW hotline if they believe the SeeTell system is down because they did not receive an SMS confirmation and DW calls them back.

Operational:

- Reporting frequency was reduced from daily (trialled initially) to three days per week in response to caretaker frustration at the high rate of reporting but slow rate of repairs; half of caretakers were to report on Mondays, Wednesdays and Fridays, and the other half on Tuesdays, Thursday and Saturdays.[16]

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16. Water points often remain closed on Sundays when people attend church.

- Re-training caretakers, particularly those who never reported, and finding replacement caretakers.

- Field demonstrations to prove that missed calls do not consume credit as feared by some caretakers.

- Repeated distribution of phones and airtime for those who lost phones or consumed airtime.

- Regular monthly meetings with caretaker groups to encourage reporting; regular calls and field visits to those not reporting to find out why and helping caretakers register new numbers.

- Adding the instructions for registering a new number to the reporting instruction cards.

A lottery incentive requires iterative, simple design

SeeSaw originally wanted to drive interest in the lottery and encourage reporting by sending caretakers an initial SMS with their lottery "ticket" number (if they reported enough to be eligible), then another SMS with the winning numbers, and finally a third SMS with the winning names to all caretakers. This process was time-consuming and did not seem to drive reporting so it was reduced to just one SMS sent to everyone announcing the winners of the lottery. It is possible that more variations on lottery structure could have been tested to increase reporting; however, the overarching issue that repairs were delayed or non-existent continued to be a more dominant factor over the lottery incentive.

Applying learnings to replication in Luanda

DW and SeeSaw are seeing more promising results replicating VerAgua in Luanda based on lessons learned from this pilot and different contexts. As of the end of May 2016, 109 caretakers will be trained and this will expand to 200 in the upcoming months. In contrast to Huambo, VerAgua is only being used for community water points on the piped network (which are most common in Luanda) rather than multiple types of water points, including handpumps. Caretakers in Luanda report daily and receive both morning SMS reminders (to report on water status) and evening SMS reminders (to report on number of hours of water). In the first five months of operation, approximately 65% reported consistently, with the percentage of functional water reports varying by zone from 15% to 71%. Caretaker reporting has also been supported by providing them with airtime although some still put this towards personal use.

The Government in Luanda has agreed to pay for the platform costs at the same cost proposed for Huambo (between USD 5-15 per annum per water point, for between 2,000 and 10,000 water points). Thus far, local water management committees have been able to support repair costs while the Government considers doing this in the future. To date, there have been 11 repairs. As the Luanda project expands, SeeSaw and DW will continue to work closely together to ensure the long-term sustainability of the system.

Customer Benefits

Under the proposed business model, DPEAH/EPAS is the customer, expected to ultimately pay for the monitoring service. The intended service improvements are anticipated to benefit these Government agencies and the water consumers as follows:

DPEAH/EPAS

The Government receives regular information on water point status, yet material benefits depend on financial commitments. Figure 11 shows that the baseline survey of 289 water points found that 24% were partially functional and 26% were non-functional. These findings were discussed with the Government to highlight the need for improved maintenance and continued monitoring. It was originally anticipated that the Government would ultimately finance the monitoring platform and repairs in order to receive better revenue returns from infrastructure investments. Despite early and continuous engagement, the Government has not yet committed to financing repairs or the monitoring service. The reasons may range from reduced Government budgets in response to dropping oil prices to the passing of a senior champion for VerAgua within DPEAH, or simply a lack of political will. Nonetheless, DW and SeeSaw predicted two to three years might be required for Government adoption and DPEAH/EPAS remain enthusiastic about VerAgua. Yet it remains to be seen if donor funds can continue to finance the platform and operations until Government adoption. However, in Luanda, the Government has thus far agreed to pay for the VerAgua system and is considering supporting the cost of repairs.

FIGURE 11

Proportion of functional water points at baseline
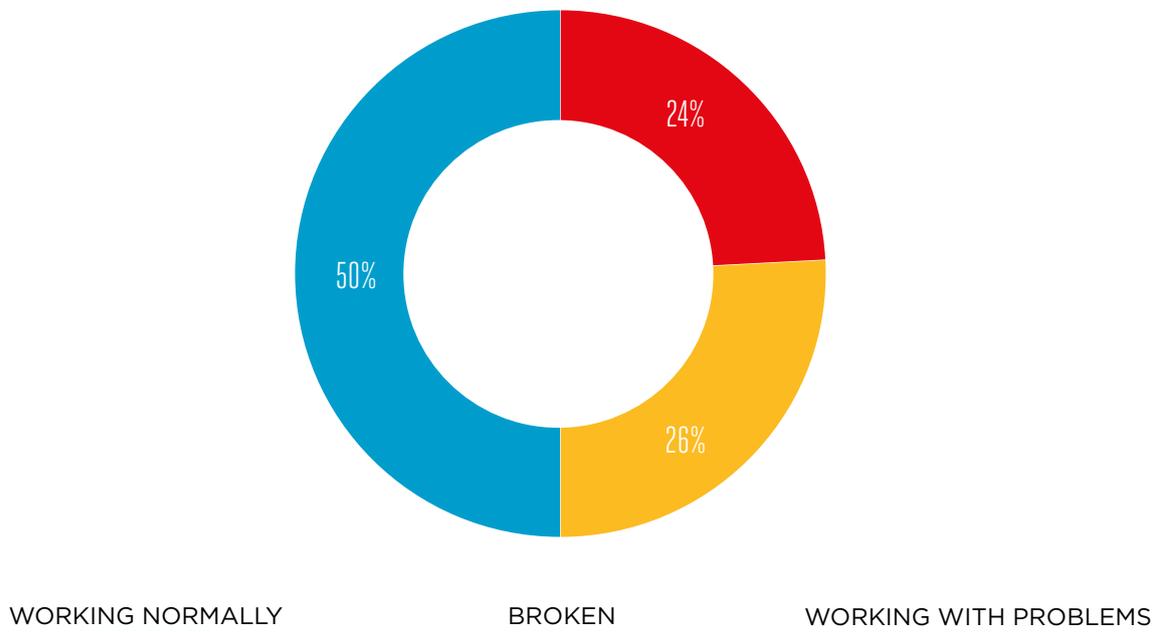
WORKING NORMALLY   BROKEN   WORKING WITH PROBLEMS

Ambiguous policies and opaque financing for maintenance hinder the impact of monitoring. For the Government to see the ultimate benefit of improved revenue collection from monitoring and repairs, several issues in money handling would need to be addressed. Firstly, the portion of revenue that caretakers actually give to DPEAH/EPAS for maintenance is variable and may be closer to 60% as opposed to the assumed 75-85%. Additionally, neither the caretakers nor DPEAH/EPAS record this information. The funds that DPEAH/EPAS do collect go into a general account rather than being ear-marked for water service improvements. Finally, communities are supposed to self-finance minor repairs, yet the specifics of this policy are ambiguous and the policy is rarely followed.

Consumers

The 33 water points repaired resulted in an estimated 23,100 people[17] receiving improved or increased water services. However, consumer surveys were not conducted and more detailed benefits or even their awareness of the service were not assessed. It is difficult to determine if the pilot has led to an increased "consumer conscience" to demand better services, but the regular stakeholder workshops that include caretakers and government may ultimately lead to this.

Consumer willingness to pay for water services was not formally measured but is variable. Willingness to pay for more reliable water services was not formally measured, although the pilot anticipated findings on this. DW encouraged communities to regularly collect funds, but the lack of transparency around how these funds are saved and shared with DPEAH/EPAS means that communities have been asked to pay "on demand" at the time repairs are needed. If revenue has not been appropriately saved, this becomes difficult because households do not pay for water if the point is broken. While caretakers sometimes do use revenues to pay for minor repairs, some communities prefer not to put money toward repairing water points if they can rely on free alternate water points, particularly shallow wells during the rainy season.

Mobile Industry Benefits

One of the key objectives of the Innovation Fund is to identify the types of mobile technologies that can support mobile-enabled services. This, in part, depends on the benefits that accrue to mobile operators from partnering to provide these services. DW and SeeSaw did not require an operator partner for this project. However, there are some benefits to operators from the existing VerAgua service and some potential benefits that could be gained through a possible future partnership.

Revenue

Although the missed call reporting does not generate revenues for operators, the VerAgua programme generates small amounts of other revenues. Caretakers must keep airtime on their phones to make the missed calls, SMS are sent regularly to remind caretakers to report, DW calls caretakers to follow-up, the SeeView mobile application uses 3G data, and each month a total of USD 45 in airtime is awarded through the lottery to incentivise reporting.

Potential Future Benefits

The replication of the VerAgua monitoring service in Luanda could provide an opportunity for more substantial mobile operator revenue. A larger group of caretakers could suggest more reasons for a partnership with a mobile operator to use special promotions to drive mobile usage and encourage reporting at the same time. Currently, SeeSaw is looking into SMS agreements with the operators. Although there could also be an opportunity for mobile payments to provide transparency in the revenue collection process, there are currently no mobile operator-led deployments in Angola. Should there be in the future, innovative services like VerAgua could leverage mobile payments for better accounting of revenue.

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17.   This is based on an estimated 700 people served per water point.

Conclusions

The VerAgua pilot provides valuable insights on the importance of both service design and institutional roles and responsibilities required for water point monitoring to lead to improved services. Despite DW and SeeSaw's efforts, reliable caretaker reporting continues to be a challenge. Aside from the absent repairs, a few factors that led to low caretaker reporting were very context specific, such as the high cost and rapid expiration of airtime in Angola. Future replication of the VerAgua platform therefore depends on careful contextualisation, sufficient resources and technical support to address challenges and make improvements.

Governments are an essential but slow moving partner in improving water services. This pilot sought to gain Government financing and adoption firstly through demonstration and advocacy. However, without an immediate solution for repairs, caretakers and consumers have become frustrated and the Government has not yet been sufficiently convinced of the value to pay for the service. Although the Government was involved at the outset, greater and more tangible commitment, beyond just verbal support, may be required from the Government for such initiatives. It remains to be seen if DPEAH/EPAS will eventually commit to financing VerAgua and infrastructure improvement, but to date, the number of water points monitored has been cut in half.

Nonetheless, DW and SeeSaw continue to see opportunities for growth of VerAgua in Angola. DWA is now implementing a USAID-funded water and sanitation project in Huambo and continued use of the VerAgua system under this initiative is being discussed. At the same time, DW and SeeSaw have recently implemented VerAgua in Luanda, have seen promising early results and remain enthusiastic that the context there and Government support will lead to a more sustainable and effective service.

Source: GSMA

Solar powered borehole.

Appendix I: Case Study Methodology

Overview: This case study is based on leanings that emerged throughout Development Workshop Angola's Seed grant through the Mobile for Development Utilities programme. These were tracked through the following:

Grantee reporting: Monthly reports were completed on activities, project risks and mitigation, and key performance indicators. These were discussed during a one-hour call with the grant manager each month. Quarterly reports were completed to document progress on milestones, the grantee's learning objectives, barriers and other key project developments as well as financial compliance.

Limitations of this study: The study aims to provide only the key learnings from DW's pilot and cannot possibly cover all the day-to-day learnings. It also aims to share learnings with the broader sector without releasing commercially sensitive data from DW or SeeSaw.

Appendix II: Different Reporting Metrics Trialled

Four status options trialled on handpumps:

PRÉDIO DO CFB

1. Escolha uma imagem que se relaciona com o problema que você deseja denunciar

2. Disque o número ao lado dele

3. Deixe o telefone tocar três vezes, então parar a chamada desligando [Se você ouvir um tom de chamada em seguida, um tom de ocupado, que também é bom, apenas desligue]

ABASTECIMENTO NORMAL
0027 21 202 4950

SISTEMA FUNCIONAL MAS IRREGULAR
0027 21 202 4951

ÁGUA DE MÁ QUALIDADE
0027 21 202 4952

AVARIA GRAVE - REPARAÇÃO URGENTE
0027 21 202 4953

See Tell ™

info@greenseesaw.com

Water On/Off, trialled at boreholes and network taps

ESCOLA PAIVA DA SILVA

1. Escolha uma imagem que se relaciona com o problema que você deseja denunciar

2. Disque o número ao lado dele

3. Deixe o telefone tocar três vezes, então parar a chamada desligando [Se você ouvir um tom de chamada em seguida, um tom de ocupado, que também é bom, apenas desligue]

ÁGUA
0027 21 202 4930

SEM ÁGUA
0027 21 202 4931

See Tell ™

info@greenseesaw.com

Hours of Service, trialled at boreholes and network taps

KAMUSSAMBA ESCOLA TERESINA

See Tell ™

1. Escolha uma imagem que se relaciona com o problema que você deseja denunciar

2. Disque o número ao lado dele

3. Deixe o telefone tocar três vezes, então parar a chamada desligando [Se você ouvir um tom de chamada em seguida, um tom de ocupado, que também é bom, apenas desligue]

0 HORA DE ABASTECIMENTO DE ÁGUA **0027 21 202 5070**	**5 HORAS DE ABASTECIMENTO DE ÁGUA** **0027 21 202 5075**
1 HORA DE ABASTECIMENTO DE ÁGUA **0027 21 202 5071**	**6 HORA DE ABASTECIMENTO DE ÁGUA** **0027 21 202 5076**
2 HORAS DE ABASTECIMENTO DE ÁGUA **0027 21 202 5072**	**7 HORAS DE ABASTECIMENTO DE ÁGUA** **0027 21 202 5077**
3 HORAS DE ABASTECIMENTO DE ÁGUA **0027 21 202 5073**	**8 HORAS DE ABASTECIMENTO DE ÁGUA** **0027 21 202 5078**
4 HORAS DE ABASTECIMENTO DE ÁGUA **0027 21 202 5074**	**9 HORAS DE ABASTECIMENTO DE ÁGUA** **0027 21 202 5079**

info@greenseesaw.com

For more information on the Mobile for
Development Utilities programme visit:
www.gsma.com/mobilefordevelopment/
programmes/m4dutilities