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Using ICT to support sustainability of water initiatives in fragile states: the case of Goma in DRC

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The water sector is increasingly adopting Information and Communication Technologies (ICT) tools to support water services in developing countries. In an emergency context, ICT tools can help reinforce the impact and resilience of projects by empowering local populations with robust systems that they can adapt to the local context and sustain in the long term. In the East of the Democratic Republic of Congo (DRC), the ongoing conflictual situation provides a continuous influx of NGOs. One consequence is that the population comes to rely on this presence, for instance for construction, operations and even monitoring of water systems. This paper looks at the case of Goma in DRC, where Mercy Corps and SeeSaw have implemented a digital system to monitor an extension of the city's water network to poor areas. The rationale behind adopting a digital system will be presented, alongside the benefits sought, as well as some early lessons.

Introduction

In fragile or post-conflict states, governments often struggle to deliver basic services to their population. External support from the international community is channelled through NGOs and humanitarian agencies that implement projects to provide basic infrastructure such as water delivery (WSP, 2011). Some emergency projects consist of building additional waterpoints, while others try to rehabilitate existing infrastructure. Others adopt a hybrid approach of construction plus rehabilitation.While emergency situations and humanitarian crises can require short-term interventions that run parallel to or outside existing national systems, it is important to work within these to develop their capacities as early as possible and to try and mainstream the work being done. This applies as much to monitoring and evaluation as it does other aspects of the project cycle.

It is widely acknowledged that to ensure the sustainability of infrastructure projects and their impact once relief organisations depart, projects must be constructed in partnership with local entities, organisations and communities, whose capacity must be reinforced and developed.For waterpoints to remain functional the local population must be able to repair and manage them in the long-term. This involves reporting faults to maintenance crews and allowing oversight organisations (whether INGOs in the short-term or government in the long-term) to track issues around functionality of supply and water quality. Both of these necessitate regular monitoring from stakeholders involved in the water network, an area that, with the rapid spread of cellphones, is ripe for the application of new approaches.

Indeed, the use of information and communication technologies (ICT) to support monitoring is growing rapidly in the water sector as in many others, such as health and education (Hutchings et al., 2012). One reason for this is the rapid development of ICT tools themselves, which are becoming more powerful, easier to use and cheaper every year. Another reason is that the use of ICT involves the digitization of data, allowing the information to be quickly and easily shared between multiple stakeholders. A third reason is that using ICTs makes it easy to create a digital "archive" that can be quickly shared and used to track performance over time. In developing countries, much hope is placed in the idea that ICT tools can help them make a "digital leap" compared to countries that have made investments in earlier technology (a good example being the use of cell phones instead of landlines in many developing countries).

WASH emergency services in fragile states

In fragile states where instability and a lack of basic infrastructure are commonplace, NGOs are often a significant player in implementing projects to support the local population in need. These NGOs (or other relief organisations) undertake "emergency" projects that bring momentary relief to the population (Welle, 2008). However it is widely accepted that once the initial crisis has subsided, and once NGOs leave the country, the sustainability of the project is endangered – partly as local stakeholders often lack the means or capacity to maintain the project activities. An example in the WASH sector is where NGOs rehabilitate or build wells and waterpoints but the local population is not in a position to repair them in the event of a breakdown, or does not know how and where to procure the spare parts needed.

Such challenges are heightened when armed conflict affects the area as is the case in the eastern DRC. This contributes to a flux of population, and the temporary abandonment or destruction of infrastructure (Biteete et al., 2014). Such uncertainty makes it very difficult for organizations to know exactly what is happening on the ground (e.g. instances where international staff members are prohibited from visiting certain places during violent conflict). It becomes exceedingly hard to track and monitor the project activities, exacerbated when locally trained people sometimes leave the area for better opportunities or because of security risks. The knowledge gained is then lost and those remaining are not properly trained or unable to take over complex systems.

The case of Goma, Eastern DRC

The Eastern part of the Democratic Republic of Congo (DRC) has been in a state of confrontation for the past 20 years. This resource-rich area is beset by rebel militias who provoke chaos in the provinces of Nord Kivu, Sud Kivu and Province Orientale. These conflicts and ongoing insecurity have driven people out of their rural villages to group around existing cities, where many "refugees" concentrate in overflowing 'temporary' suburbs. In addition to this, in 2002 the provincial capital of Nord Kivu, Goma, was partially destroyed by the eruption of the neighboring volcano Nyiragongo. This damaged most of the existing water infrastructure.

In DRC, the main water provider is called Regideso – a parastatal that covers the main urban centres. Although it is decentralised and has provincial headquarters, most of the financial and strategic decisions are taken at its headquarters in the capital, Kinshasa. Budget flows are unpredictable and private connections attract the majority of attention, whereas in reality public shared connections make up for one third to half of the utility's revenue on average (Tsitsikalis, Prié, 2014). The general lack of reporting and information gathering prevents reliable investment programming according to needs. However, Regideso is undergoing reforms in order to improve its efficiency, supported by the World Bank, amongst others.

In Goma Regideso provides households with a mix of shared public connections and private connections (available to a privileged minority). Many shared public connections - "standposts" - have been built by various NGOs over the last decade. However Regideso has difficulties maintaining and supplying these standposts, many of which are in a poor state of repair and even where functional, water supply is often intermittent. The public standposts face strong competition from private connections selling to neighbours, and from mobile vendors and water trucks. They are often not repaired and have low cost recovery.

Mercy Corps' activities in Goma

Rehabilitation and extension of the water network

The international NGO Mercy Corps has recently extended the water network in the northern part of Goma, home to a large low-income population (USAID, 2013). The project has rehabilitated some existing standposts, constructed new ones and has built two large reservoirs and installed 27km of new pipeline. Eventually the project will allow 250,000 people to have improved access to safe drinking water. Mercy Corps works in partnership with Regideso, the international NGO ICRC, and a local NGO Yme Grands Lacs to manage the project.

Delegated Management Practice

This management of the extension project is through a delegated management approach. The daily management of standposts is undertaken by the local NGO, Yme Grands Lacs, which reports to Mercy Corps. Delegated management is fairly new to the DRC but has long been implemented in West Africa. Delegated management aims to professionalize the activity of standposts and ensure the sustainability of the

system, both in terms of the technical side (water supply) and financially (ensuring profitability). The arrangement is designed in a way such that the local agent is motivated to quickly identify and respond to problems at standposts and report to the 'client' (in this case Regideso) on a regular basis. To facilitate this it is important to simplify the reporting process without 'dumbing it down'.

To ensure the sustainability of new and rehabilitated network, part of the project focuses on the management and monitoring of activities and takes care to involve the different stakeholders. Operational and financial information about the network is shared on a monthly basis between Mercy Corps, the local NGO Yme Grands Lacs and the water provider, Regideso.

Monitoring

Standposts are equipped with two meters, one to monitor daily consumption, and another hidden and locked that allows the bills to be calculated. On a daily basis collection agents collect all revenue generated at each standpost. Information such as the name of the vendor, meter readings (old & new), consumption, income and observations are also collected daily during their visits. The water vendors and collection agents each have a paper-based registry, from where the information is typed into a computer and shared with supervisors.

Challenges

Collecting agents face significant logistical issues, including transport difficulties. They must visit all standposts daily to collect revenues and read meters. Historically, performance at each standpost and potential challenges were mostly relayed during in-person meetings, in a sometimes ad hoc way and with serious challenges in record-keeping. This lengthens the reaction process as stakeholders are usually informed only once a day or every other day about situations arising in the field, such as a cut-off in water supply. Any information collected is scattered and not automatically shared immediately with partners. It takes time for information to circulate, whilst the communication needs of every stakeholder involved in the project differ and not all were being fully met. This situation contributed to Mercy Corps' decision to harness ICT in supporting monitoring and evaluation.

Implementation of a digital monitoring system to monitor the water network performance

The need

The delegated management approach entails that the management of the system is eventually fully handed over to local actors. Building real local capacity to underpin the long-term sustainability of the network and its self-sufficiency is thus paramount. There is also an opportunity to bring in a new level of professionalism and create good reporting habits. Although the project covers only some of the city, a wider influence is possible, in which a new reporting system would be able to influence how other standposts serving poor areas are managed.

Prior to the implementation of a new Information Management System (IMS), much of the data was collected by hand, posing challenges with data collection, errors in transcription and entailing the additional burden of having to type in the information. More directly digitising data collection, made possible through the use of cellphones make possible, brings certain advantages.

SeeSaw specialises in working in developing countries and in adapting ICT tools to support the water sector. This contributed to it being selected by Mercy Corps and partners to deliver the new IMS. SeeSaw's particular approach is to build on existing monitoring practices and to harness institutional incentives at the same time as adopting new technological tools (such as cellphones).

Following a needs assessment with all relevant stakeholders, the revised needs of the IMS were set out as:
- allowing staff to report on daily water vending activity at standposts
- including the possibility to report on specific technical problems
- tracking revenue collected and comparing this to volumes of water produced, distributed and sold

The IMS sets out to take a deliberate approach to involving various project stakeholders as both users and beneficiaries. The wider goal is to develop a robust and practical system that permits improved management and circulation of information from all stakeholders involved.

Significant advantages of using digital tools over paper-based approaches are the additional options to centralise and dispatch information quickly so every stakeholder gets relevant information in real-time

(World Bank, 2011). A practical benefit is that speeding up the communication of technical problems can lead to faster repairs. Going further, improved information sharing helps to reinforce the responsibilities of each stakeholder regarding the proper operation of water points and the steps required to ensure on-going supply of water to the local population.

In practice

Tracking the performance of the water network in real-time – and including automatic alerts when abnormal patterns are detected - allows local stakeholders to fix issues as early as possible, limiting losses and stopping undesirable behaviour at their outset (e.g. theft or vandalism). Local staff members from the NGO Yme Grands Lacs (both water vendors and collecting agents) are responsible for daily data collection. The system takes a twin track to data collection – on one hand using basic phones for vendors (building on the fact that all vendors own one and are familiar with their use) and on the other hand equipping collecting agents with smartphones (allowing in-field calculation of amounts owed and the taking of GPS co-ordinates and photos). Data collection is made as easy and quick as possible so it does not become an additional burden. A rapid feedback loop is built in, with both vendors and collecting agents getting confirmation of their reports via SMS that they receive on their personal phones.

The 'new' digital system takes care to build on existing monitoring practices and does not replace the daily trips to standposts, which serve a valuable purpose both for regular communications and for oversight. Water vendors can communicate via 'missed calls', which are free, various situations faced at their standpost, which allows the local NGO and Mercy Corps to be immediately aware of challenges and technical problems. Agents at the reservoir also communicate reservoir levels and production cycles through a similar process of 'missed calls'. On the other hand, collecting agents use smartphones to capture meter readings and amounts of money generated at standposts during their daily visits. The data coming from these three information streams is merged into a database that is set up to do automatic analysis and aggregation, detecting unusual consumption and distribution patterns. Alerts and reports are sent out automatically to selected stakeholders (including neighbourhood water committees) who now have real-time information about the water network's performance.

The benefit

By implementing ICT tools at different levels of the network's flow, Mercy Corps now has comprehensive information that covers the production, distribution and consumption levels. This information is cross-checked and incoherent reports (e.g. a full reservoir but no water at standposts) are particularly useful to detect inconsistent or false reporting, or specific issues that would be hard to detect when collecting information only at the end point.

Increasing transparency and reducing the room for corruption or malpractice is important, especially in the context of the eastern DRC where insecurity is ubiquitous and has a strong impact on daily activities. The digital system helps to keep pressure on all stakeholders to act according to their responsibilities, as their actions or the lack thereof are made visible to all within a short time.

The system is also designed to be robust and easy-to-use, fitting in with the capacity of the user at various levels of the system. 'Missed calls' are not only free, but part of local culture and understood by all – avoiding some of the literacy and cost (as well as 'machine unreadability') issues associated with sending information via SMS. Reports and alerts are sent to people using tools they are familiar with and used to using – such as SMS to vendors and emails to NGO or water utility managers. It is not assumed that stakeholders can access the internet continuously, nor get information 'in real time' – rather the system focuses on more robust ways to get the information to the people that need it 'at the right time'.

A contingent benefit, albeit not one yet tested in practice, is hoped to be in the sustainability of the system – putting in place a system that can be passed on to the water utility once the INGO withdraws and also customised to evolving needs in future years. A software-as-a-service approach means that no costly and hard-to-maintain servers need to be put in place and the only spare parts needed (smartphones and SIM cards) can all be bought locally. Payment on a quarterly basis for a 'service' also maintains a channel of communication between the providers of the system and the local stakeholders using it, meaning it can be easily adapted as time passes. Nor are these stakeholders locked in a totally new sophisticated system, because as far as possible, locally-available and interchangeable tools (e.g. Gmail) are used to provide the backbone of the system.

Key learning points

Whilst it is still early days in terms of full impact and sustainability, some early lessons include the following:

- Conduct a rigorous needs assessment – not only of managers but at the different levels of those who use and are asked to provide information. This is a step often missed, but that can be crucial to making sure a system is as effective as its champions hope.
- Build on existing monitoring habits and communications customs (e.g. 'missed calls'). This lessens the training and 'change management' needed at local level, which is important for maintaining a flow of accurate and timely information.
- Source different sources of information in ways that allow automatic 'cross-referencing' and validation of the data. This approach can be an important factor in avoiding the problem of 'rubbish in, rubbish out'.
- Email and tools such as Excel are still the 'ICT tools of choice' for most stakeholders; any IMS should be wary in trying to supersede these for more 'sexy' alternatives.
- Creating a tight feedback loop and the acting on it is important to retain the confidence of those providing the information. This means not just confirming that reports have been received but addressing technical problems, or clamping down on malpractice.
- Care should be taken before seeking to 'crowdsource' information. It is easier to collect information from a small group of manageable insiders than to cast the net to the general public (and sometimes the benefits of the 'crowdsourcing' can be replicated in other ways, such as by cross-referencing information provided, or polling small groups).
- "Follow the money"; any system that delivers financial benefits to the users and tightens controls is likely to get more attention from influential champions needed to carry it through. It also means that software-as-a-service approaches can be demonstrated to pay for themselves. Nevertheless addressing financial issues, especially in the context of fragile states, means that powerful constituencies may align against new reporting systems – so contingency strategies to deal with this before it happens are helpful.

Conclusions

The need to strengthen monitoring in the water sector is a hot topic of late, and this is nowhere more true than in fragile states. The challenges that such contexts bring up often contribute to a widespread tendency to 'worry about monitoring later' but this is at best risky, and at worst foolhardy. New ICT tools are in widespread use in other sectors and these tools offer great potential to those looking to improve monitoring in the water sector.

This case study from the DRC emphasizes the potential of using such ICT tools in an emergency context, and discusses how to put sustainable digital systems in place that are not only handled locally but built on familiar and existing practices.

By sharing important information to various stakeholders on a daily basis and involving local staff in data collection, the "ownership" and responsibility of the monitoring system is transferred to them. The participants not only signal real-time information but they benefit from a feedback loop that engages them in the management of the network significantly more than before, especially true for the water vendors who are the heartbeat of any urban network serving disadvantaged communities.

References and further reading

Biteete, L, Schaub-Jones, D & Szczuczak, L, *Cahier n°5 – Quelques scénarios pour le suivi des systèmes – promouvoir l'extension des mini-réseaux et des bornes fontaines en RDC,* Paris, Gret, 2014

Foster, T, F. Pesin and D. Schaub-Jones (2012b) *ICT-focussed initiatives about water and sanitation.* SeeSaw PowerPoint Presentation.

Foster, T. et al. (2012a) *Mobile water payments in urban Africa: adoption, implications and opportunities.* Global Water Forum. Discussion Paper 1206.

GIZ (2009) *The use of ICT in the Water Sector. Management Information Systems to support regulators and resource management.* Eschborn.

Hutchings, M. et al. (2012) *mWASH: Mobile Phone Applications for the Water, Sanitation, and Hygiene Sector*. Pacific Institute: Oakland.

Mercy Corps (2014), *Goma Water Project Network, Project Documentation*

Sattler, K. (2012) *ICT in the water sector: Trends, issues and challenges - A background paper for "But does it float? The real stories behind ICT in the Water & other sectors"*, SeeSaw, South Africa

Schaub-Jones, D, *Considerations for the successful design & implementation of ICT systems in the WASH sector,* IRC Symposium on Monitoring Sustainable WASH Service Delivery, Ethiopia, April 2013

Schaub-Jones, D, *Harnessing ICT to strengthen the responsiveness of regulation in the water sector. A look at the case of Mozambique and an overview of emerging lessons from Africa,* African Forum of Utility Regulators, AFUR 10th General Assembly, Arusha, Tanzania, April 2013

Schaub-Jones D, Beilharz J & Nash A, *Applying ICT to solve complex WASH challenges: insights and early lessons from the water and health sectors*, 36th WEDC International Conference Papers, Nakuru, Kenya, 2013

Tsitsikalis, A, Prié ,G*, Cahier n°3 – Analyse de la gestion des bornes-fontaines par la Regideso – Promouvoir l'extension des mini-réseaux et des bornes fontaines en RDC,* Paris*,* Gret*,* 2014

USAID (2013), *A New Life for Goma's Water System,* Frontlines Online Edition. In : http://www.usaid.gov/news-information/frontlines/water-neglected-tropical-diseases/new-life-gomas-water-system

Water and Sanitation Program (WSP), *Delivering Water Supply and Sanitation in Fragile States: The transition from emergency to development*, Conference Report, Nairobi, Kenya, 2011

Welle, K, *Improving the provision of basic services for the poor in fragile environments Water Supply, Sanitation and Hygiene International Literature Review,* Humanitarian Policy Group*,* ODI*,* 2008

World Bank (2011) *In Africa, Technology Helps Citizens Hold Their Governments Accountable.* In: http://web.worldbank.org/WBSITE/EXTERNAL/COUNTRIES/AFRICAEXT/0,,contentMDK:22910663~pagePK:146736~piPK:226340~theSitePK:258644,00.html

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