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**Using ICT to support water sector monitoring:
how underlying drivers shape incentives and outcomes**

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The use of new ICT tools to support water services provision is expanding rapidly. Mobile phone and web technologies are particularly being used for monitoring the performance of service providers (e.g. for data collection, the reporting of break downs or oversight of service delivery). This paper looks at some of the drivers underpinning this trend and suggests how these drivers need to be understood during the design of any ICT-based monitoring system. Our observation is that too often the focus appears to be on the tools themselves or on the ability to collect data in a different way – and not sufficiently on what the data gets used for (or how the provision of data can actually change the dynamics on the ground). As a South African based company working in the ICT and water sectors, SeeSaw has good experience of designing and adapting ICT tools to support the WASH sector – we leverage this to suggest some early lessons and to suggest a slight ‘reality check’ to the implementation and adoption of ICT – making sure that the positive contributions are not lost through poor design or over-ambitious approaches.

Introduction

Urban water services providers in Sub-Saharan Africa are struggling to deal with a wave of urbanisation. More than 50% of the world’s population now live in urban areas and, of all continents, Africa is experiencing the fastest urbanisation rates (UN, 2011). Yet it is not only the large mega-cities that are the poles of this growth – it is also the small- and medium- towns that are absorbing a major component of this expansion. Whilst mega-cities might be better resourced to respond to these challenges, typically water and sanitation providers in secondary cities and smaller towns are ill-equipped to address these developments. For those charged with overseeing water provision (national departments, ministries and regulators) the way urban growth is developing presents a particular challenge, requiring them to pay more attention to a growing number of urban poles rather than being able to focus predominantly on a handful of large metros.

Meanwhile, telecommunications continue their rapid technology advance and societal uptake. In mid-2013 it was estimated that more Africans had mobile phone subscriptions than had access to improved water sources (Foster et al., 2012a). Partly as a consequence of observations like this, a growing number of sector professionals are starting to ask whether the rapid growth in information and communication technologies (ICT) offers new opportunities to water providers to address some of their enduring challenges. Pioneers in this field have suggested that, if harnessed effectively, technologies such as mobile phones and online databases can – when allied with better monitoring - significantly boost the performance of water providers.

Those interested in this topic – better monitoring by harnessing ICT – come from various parts of the water sector such as multilateral institutions (World Bank), NGOs (such as IRC, WaterAid) and water utilities themselves (examples include Nairobi water with Maji Voice and mobile payments with NWSC in Uganda). Water services providers are themselves interested as they believe ICT can help them streamline their operations, bring management ‘closer to the field’ and help them more quickly identify and respond to service delivery challenges. National governments and regulators are interested, not just from a planning standpoint but in order to keep track of how water services providers are doing (and to reduce the time between service delivery challenges and regulatory or supportive responses). They are also keen to improve the quantity and quality of the data they collect as they believe this will enable them to better fulfil their

roles. In countries where donor agencies play a significant role there is a further drive towards improved monitoring, as a significant number of donors look to shift from traditional means of distributing aid money to approaches such as ‘payment by results’ (Clist, Verschoor, 2014). These types of approaches – which emphasise withholding financial transfers until after delivery on the ground has been demonstrated – require new ways of monitoring and verifying impacts. For their part civil society is particularly interested in the role ICT can play in boosting transparency and increasing the accountability of service providers.

Partly as a response to this, and partly due to the wave of technological innovation sweeping across broader society, an increasing and diverse number of initiatives involving ICT are being undertaken. This paper takes a closer look at some of the drivers behind the adoption of ICT tools, shares learning and shows how emerging lessons are being put into practice.

How do ICT and monitoring relate to each other?

Traditional reporting systems in the water and others sector usually exhibit very linear and closed flows of information. Traditional systems tend to rely on their data from field staff of the water service providers (often municipal staff) who submit this at the end of a specific reporting period (perhaps daily, weekly or monthly) via their IT system (unless it is an entirely manual process, which is certainly not unknown). From there the data passes via accounting, engineering and other internal departments to senior management (often with significant delays). Providers then submit a ‘prepared brief’ to any regulator or policymaker – perhaps monthly, or more often quarterly or less often. The rapid evolution of ICT tools allows ‘new systems’ to radically depart from this practice. New avenues for collecting data – including automatic gauges and smart meters - and falling transmission costs have led to an explosion in the amount of data that can be practicably collected (and turned into useful information). This can also be done now in almost real time, with the rapid collection of a range of data in both higher quantity and quality now possible. A range of researchers have looked at us, with one well known 2012 study entitled “mWASH: Mobile Phone Applications for the Water, Sanitation, and Hygiene Sector” (Pacific Institute, 2012).

Managers are typically the first to harness this innovation – being able to get real-time information on what their staff in the field are facing. Whether more data leads to better results depends on a whole range of things, but the internal impetus to ‘be in the know’ is often a strong driver. Furthermore, the source of the data is no longer limited to just the field-staff of the water services provider – as well as ‘smart meters’, information can more easily and rapidly be collected from the public directly (either customers or concerned ‘members of society’) as well as other organisations, such as NGOs or community-based organisations (CBOs). This can be both for the benefit of managers, but also other stakeholders. For instance, in Mozambique, where SeeSaw is working with the national water sector regulator, there is a desire that citizens can ‘reach out’ beyond the direct water supplier, using ICT to express their views to other sector organisations.

The implications for monitoring are significant. When SeeSaw surveyed, in 2012, the range of innovations taking place around ICT usage in the WASH sector (Sattler, 2012), it was evident that the main drivers for water and sanitation stakeholders to adopt ICT fell into three broad categories:

1. ICT improves access to information (which can improve decision-making);
2. ICT can bring immediate and long-term financial benefits; and
3. ICT allows confidence-building between stakeholders, which contributes to greater responsiveness, mutual accountability and trust.

Of these three, the first two are proving particularly significant drivers for the adoption of ICT in water-sector monitoring initiatives, which we now turn to.

Why are water service providers interested in monitoring?

An early lesson from the 2012 study referred to above was that to get ICT innovation working to its true potential, it is crucial to pay attention to the incentives that the key users and stakeholders in the system have to adopt, resist or ignore change. Given this, any discussion about the usage of ICT in monitoring should start with an understanding of why it is that service providers, sector role-players and stakeholders, and others are interested in monitoring in the first instance.

SeeSaw’s work across ten African countries suggests that the following framework covers the majority of scenarios where improved monitoring is being discussed. In the figure below, the impetus towards improved monitoring either has an internal or external source and has as a primary driver either financial or efficiency-related considerations.

Table 1. Main drivers for wanting better monitoring of water services (SeeSaw survey, 2012)

	Internal	External
Financial	The stimulus here is improving the financial position of water provision. A water service provider in this scenario may accept closer monitoring in order to be more transparent and have a digital track record – believing this will help it attract investment. It may see monitoring as a way to control costs or improve revenue. The impetus comes from the provider (is internal) and the quadrant is often indicative of a “mature” or well-capacitated water service provider.	Scenarios in this quadrant are more driven by outside parties that ‘hold the purse-strings’. One example is where a water provider needs to demonstrate performance to donors before certain payments are made (e.g. triggering payments on payment-by-results or output-based-aid approaches). A situation where a bank requires a water provider to adopt a certain reporting conditions (or systems) as part of a loan package would be another example.
Efficiency	A common scenario in this quadrant is managers wanting to improve internal efficiencies. Benchmarking processes may fall within this category. Instances where staff are encouraged by management to adopt new reporting systems – perhaps in order to provide new or more ‘real-time’ data - would fall within this category also. The adoption of new reporting templates or HR tools to improve efficiency falls here too. Scenarios in this quadrant are usually indicative of “mature” or well-capacitated water service providers.	Here the drive to improve efficiency is largely coming from external parties or mechanisms. This could include where formal regulation is in place and the regulator is pushing the adoption of new ICT tools. It may include a push from customers to adopt innovations that improve the service. Benchmarking processes may also fall within this category depending on the where the impetus for them comes from.

As the above table suggests the main drivers for better monitoring are quite different in nature. This has important implications for how any ‘monitoring system’ should be designed and the way that the participants in such a system relate to it (we give examples below). Indeed, whilst it is clear that there are significant opportunities for ICT to enhance monitoring, it is also clear that the way ICT tools will be used or abused (or even just ignored), depends a lot on what motivations underlie monitoring in the first instance. As a way to look more closely at how these drivers work in practice and what they mean for the design of monitoring systems and the role of ICT therein, we now look at two case studies that SeeSaw has been working with since 2012. These are CWS in Ghana and CRA in Mozambique.

In Ghana SeeSaw is working with CWS (Community Water Solutions), a social enterprise that helps Ghanaian women to establish small businesses by training them how to treat water and sell it to their communities. We are using mobile technology to shorten the communication channel by allowing entrepreneurs to use basic phones to report to CWS field staff a set of specific operational challenges they face. In Mozambique SeeSaw is helping CRA (*Conselho de Regulação do Abastecimento de Água*, the national regulatory body for the water sector) to design and pilot a monitoring system for small water schemes all over the country. Initially responsible mostly for tariff regulation of the largest cities in the country, its mandate has recently expanded and it now includes much smaller systems - these that can be quite remote from CRA’s head office in Maputo and the capacity of their operators is quite different from those running water systems in larger cities.

For CWS, in respect to the framework presented in Table 1, the drivers are largely internal. Their motivation is the idea, via quicker and more participatory reporting systems, to have better oversight of operations with this then delivering substantial improvement in efficiencies. The benefits for CWS are both logistical and financial, as thanks to closer monitoring field staff have been able to space out their in-person visits to the entrepreneurs, most of whom operate in remote locations where access might be difficult. It has also helped to maximise the effectiveness of field staff by allowing them to respond faster to specific issues that would otherwise lead to downtime of services.

The internal motivation (with adoption and roll out being championed by CWS) has been strengthened by having benefits quickly and clearly visible to both management and field users, which motivates them in turn to adopt and expand the use of the system. This is important, as in instances where the drivers for adopting improved monitoring are purely internal, should motivation wane, the platform will either not be adopted or will not have useful, timely and relevant information entered into it. Moreover, where the desire for better monitoring is internally driven, field-focussed organisations such as CWS that are using ICT are also more likely to involve themselves in both design and in suggestion improvements over time – something that has been the case and has so far helped the new system both scale up and be sustained over time.

Where the driver is external, such as in Mozambique, a different dynamic applies. Here, should water service providers not appreciate the initiative or not find it useful for their own purposes, the risk is that they only make token efforts to provide reliable and complete data. In either case the risk run is one of “rubbish in, rubbish out” whereby decisions risk being made on the basis of unreliable, out-of-date or incomplete data and are, at best, ‘sub-optimal’ (or, worse, nonsensical).

Whether the drivers for adopting stronger monitoring are internal or external, whether the primary motivation is related to finances or efficiency, any efforts to introduce ICT innovations (or, for that matter any new or amended monitoring system) need to both understand and plan around existing incentive structures. This is a clear lesson from both our and others’ experience, and a good example of this is the Maji Matone case in Tanzania (more on which can be found in Schaub-Jones, 2013a, a presentation to the African Forum for Utility Regulators). Indeed, existing experience both inside and outside the water sector in regards to monitoring and the use of ICT suggests a few key lessons.

Key lessons

User-centric design

Understand the motivations of key stakeholders to adopt monitoring tools and design them so they deliver value for them. If there is no internal motivation for adoption, then other measures need to be taken to incentivise adherence. Listen to what users want and need and will find useful, rather than making broad assumptions about what ‘you think’ will be useful. Provide tangible benefits to those being asked to spend time using the system, especially those that need to feed the data into it.

Change management

Appreciate that the introduction of a new ICT tool can be considered a “change management” process. Such processes are notoriously difficult, but we can learn from existing experience in this. Buy-in at different levels of the information flow will be needed as will be leadership commitment. It is also very helpful to show quick and visible benefits (“quick wins”). Another principle of change management is, to a sensible extent, to build on what is there, to use existing assets and leverage good practice. Fitting the system to users and not vice versa, is a key part of achieving this.

Understanding incentives

As any reporting system is only as good as the data being fed into it, incentives are important at various levels. A key question is why those who need to submit data will do so. What are their incentives to provide reliable and timely data? Moreover, no ICT tools, however good, are going to automatically solve all existing challenges. ICT helps you identify and structure challenges but action is still needed to resolve these. What are the incentives that will turn information into action? Are these strong enough?

Start with what is truly important and grow from there

There is always a temptation to ask for as much data as possible. But this is usually unrealistic and can often pose too great a burden on those being asked to provide it. It can also undermine motivation - people faced with unreasonable or unmanageable requests may fail to provide the simple information that is truly needed. It is easier to start with a simple set of data to be collected - the ‘truly important’ - and go from there. Scaling up is easier than scaling back and all ICT projects benefit from an iterative approach to design and development that encourages short and frank feedback loops from real users.

Sustaining the system over the long-term

All systems have running costs and ICT is no exception. It also needs to evolve with the times and this requires inputs of time and money. Payment for the system's running costs (even if the software is free) is vital - and people pay for what they think has value. Is the ICT tool/service valuable or seen as valuable? If it is not seen as an essential need, but rather a “nice-to-have”, the sustainability of the tool/service will be in question. Direct monetary cost is also not the only consideration - another is the cost in terms of efforts being asked of those inputting and those processing (and acting upon) the information. This cost can quickly become non-negligible; if it is seen as a burden, then can the system be sustained?

Designing a national monitoring system for small water schemes in Mozambique

The work SeeSaw is doing with CRA to design and pilot a monitoring system for small water schemes across Mozambique, takes the above into account in the following ways:

User-centric design & change management: The starting point has been to fully map existing information flows and conduct a structured appraisal of what benefits are being sought, at what level of the system these will accrue and to identify where any 'crunch points' sit (i.e. where the costs of the new system risk outweighing the benefits). We are also, to the extent possible, undertaking a participatory design of the system – not just with head office but with regional staff and with the operators who will be asked to send in information. There is a concerted effort to build on what good practice and 'organic systems' of data collection and transmission already exist. Lastly, we are paying attention to how quick wins can be generated and communicated to those within the system.

Understanding incentives & focussing on most important issues: We are looking closely at what the incentives of key stakeholders are to put reliable information into the system and what their motivations to either adopt, ignore or undermine a new reporting system might be. Strategies to address these incentives are being developed – to the extent that the pilot project tests our initial assumptions around these is the cornerstone of a process of iterative design to improve the initial ideas. We have spent time categorising what is 'important' and distinguishing this from what is 'nice to have' - trying thus to design the system such that it asks for little data at first but can easily grow from early success. Lastly we are adopting an iterative approach to not just to the design and development of the pilot phase but making this attribute one of the considerations in judging suppliers of ICT systems (do they encourage short and frank feedback loops from real users and then address this? Is their system flexible enough to accommodate this?).

Sustaining the system over the long-term: A key question here is to ask from the outset what will be considered 'value' by the various users and how this may contribute to paying for the system's running costs. We also look to minimise the efforts being asked of those inputting data and trying to align them with existing data gathering process (and providing a quick feedback loop so that they a) can use this information themselves and b) get the feeling it is being 'used' by others.

Conclusions

The use of new ICT tools to support water services provision is expanding rapidly and these offer particularly fertile ground for those seeking to improve monitoring in the water sector. It is important though to understand what the drivers for any monitoring initiative are and how these will shape the adoption – or not – of any new ICT tools.

Too often the focus is on "which tool" or "which technology", whereas it is crucial to pay great attention to what any data collected will be used for and how the provision of this data leads to actual actions that change the dynamics on the ground.

We have looked at the different drivers for monitoring – from internal to external – for financial reasons versus 'for efficiency' – and suggest that applying this framework to any new monitoring initiative can reveal a lot about why stakeholders will engage or disengage.

Based on SeeSaw's experiences in designing and adapting ICT tools to support the water sector, we have sought to bring a 'reality check' to the implementation and adoption of ICT – partly to ensure that positive contributions are not lost through bad design, over-ambitious approaches or misaligned incentives.

Case studies from Mozambique and Ghana have helped clarify that the use of ICT tools alone cannot solve issues, and a number of accompanying activities are required, including the need to raise awareness about and to prioritise monitoring (from Mayor to Technician), to forge good communications between diverse role players, to put in place well-designed feedback loops. Above all, there needs to be commitment and capacity to turn data collection and interpretation into actions. When supported in this way, the application of ICT tools (whether cellphone or web-based) can:

- Drive greater appreciation of the requirements for effective water services management
- Lead to progressive improvement in water services

- Offer real-time reporting of quality of service of water quality by municipalities and other service providers
- Provide a means to cross-check this information with customers, citizens and other groups
- Enable early or strategic intervention in areas facing immediate public health threats

In these and other ways, ICT tools have a significant role to play – and merely by considering adopting ICT tools, stakeholders in the water sector become more aware of issues of concern and of bottlenecks in delivery. This process, whether a new innovation is finally deployed or not, assists with directing limited resources to areas of real need.

In terms of organisational impact, ICT tools offer great scope for efficiency improvements, for better co-ordination and for improved finances. By leveraging ICT significant improvements in water services can be achieved, even within existing capacity constraints. In other words, by simply having structured programmes in place and by working “smarter” with better information, a municipality (or other water service provider) can become more effective and make best use of the capacity it already has.

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