LESSONS LEARNT FROM THE IMPLEMENTATION OF ICT APPLICATIONS TO SUPPORT THE WATER SECTOR

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ABSTRACT

The use of new ICT tools to support water services provision is expanding rapidly. Mobile phone and web technologies are used for monitoring the performance of service providers (e.g. for data collection, the reporting of break downs and the oversight of service delivery). Yet too often the focus appears to be on the tools themselves and 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). SeeSaw and Emanti Management are two South African based companies that are working in the ICT environment and developing tools for the water sector to improve water services.

This paper looks at specific case studies in attempt to broader understanding of how ICT can be used to strengthen monitoring, to discuss the different drivers that shape stakeholder's adoption of better monitoring and to suggest how to go about designing new systems in order to have maximum impact. Lessons from South Africa, Tanzania and Mozambique are shared on issues such as: user-centric design; change management; how to assess and harness incentive structures and ways to sustain progress over the long-term.

BACKGROUND

SeeSaw is a South African social venture that helps water providers and other sector stakeholders to adapt new information and communications technologies (ICT) to support their activities. A particular focus for SeeSaw is on understanding the incentives that underlie how water and sanitation is delivered or managed and how these incentives need to be factored in to the design and delivery of any information and communications technology 'systems'. We have worked across Africa (Mozambique, the DRC, Madagascar) on strengthening the monitoring of WASH services through ICT platforms and wish to share some of that learning here.

Emanti Management is a South-African consultancy specialising in Water and Environmental Engineering. Emanti has a recognised track record in supporting the delivery of water services by Local Government – as part of this work it has designed and managed a range of appropriate water sector tools, with a particular focus on identifying and managing risks. Emanti strives to ensure its tools are sector appropriate by integrating inputs and ownership from key South African water services stakeholders, including municipalities, the Water Research Commission, Department of Water Affairs, South African Local Government Association, and Institute of Municipal Engineering of Southern Africa. Better known applications and tools recently developed by Emanti Management include, Water Safety Planning tools, Wastewater Risk Abatement Planning tools, tools to facilitate Municipal Strategic Self-Assessments (MuSSA) and the associated Municipal Priority Action Plans (MPAP), the national Municipal Benchmarking Initiative system, and the Electronic Water Quality Management System (eWQMS).

Based on our shared experience of designing and adapting ICT tools to support the sector, the two organisations came together to write a joint paper to share with the WISA community. We did this as we wish to contribute to:

- A better understanding of how ICT can be used to strengthen monitoring in the water sector
- Discussion of the different drivers that shape stakeholder's adoption of better monitoring and the implications these have for ICT initiative
- To discuss under what circumstances ICT tools are useful and how to go about designing new systems in order to have maximum impact
- To bring a slight 'reality check' to the implementation and adoption of ICT – making sure that the positive contributions are not lost through bad design or over-ambitious approaches
- To share some lessons from both our and others' experience

INTRODUCTION

Urban water services providers, both in South Africa and in other countries south of the Sahara, 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. 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 the secondary cities and smaller towns are ill-equipped to address these developments. Even where municipalities or water utilities are adept from an engineering standpoint, they can struggle to keep up with urban planning or with regulatory requirements relating to levels of water quality or service delivery. For those in the sector charged with overseeing water provision (national departments, ministries and regulators) the way urban growth is developing presents a further 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.

Even as water services providers struggle to keep up with these developments, telecommunications continue their rapid technology advance and societal uptake. Sometime 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 data bases can – when allied with better monitoring - significantly boost the performance water providers.

Those interested in this topic – better monitoring by harnessing ICT – come from various parts of the water sector. 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 – whether this be tariff setting, enforcement of water quality directives or the facilitation of benchmarking or sector learning. 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'. 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.

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 is as true of the situation here in South Africa as it is in other African countries (and, for that matter, many countries, both 'developing' and 'developed'). Yet as more initiatives come to fruition, it is becoming increasingly clear that to harness the full potential of ICT, any innovation needs to address real needs on-the-ground (rather than see ICT tools developed "because it looks like a good idea"). The old business adage "business needs drive IT, IT needs do not drive business" is as relevant as ever.

This paper takes a closer look at some of the drivers behind the adoption of ICT tools, shares learning from several established case studies and shows how these emerging lessons are being put into practice.

HOW DO ICT & MONITORING RELATE TO EACH OTHER?

Traditional reporting systems in the water and others sector tend to exhibit very linear and closed flows of information. As the figure below-left shows, 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) to the IT system. 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.
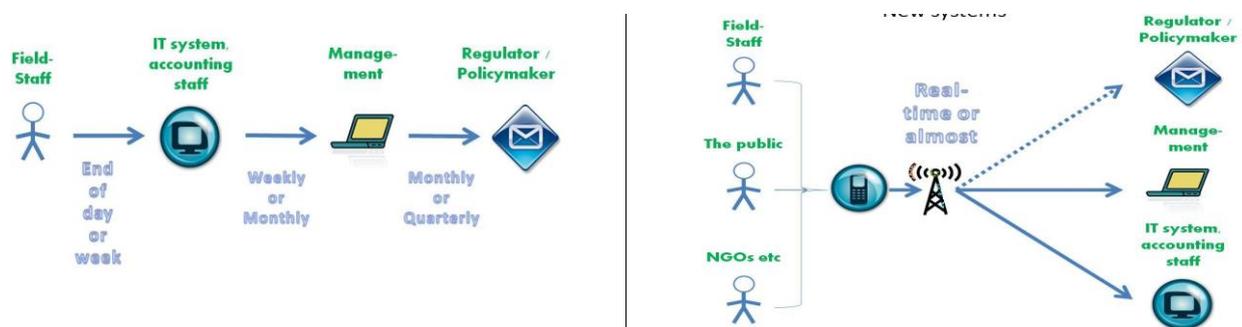

Figure 1: *Traditional versus 'new' flows of information in the sector*

The rapid evolution of ICT tools allows 'new systems' to radically depart from this practice. New avenues for collecting data 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.

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 – but 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 in the system. 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 and use ICT to express their views to other sector organisations.

Developments in ICT can also more easily make existing hardware 'smart'. Whereas telemetry has been around for some time (relaying, for instance, reservoir levels to pump station managers),

the spread of cellphone networks and longer-lasting batteries is making innovations more accessible. Several water utilities in Africa are connecting various parts of their network to the cellphone network – overcoming some of the limitations of existing telemetry – but also making it possible to link even household meters via the 'web'.

The implications for monitoring are significant. When SeeSaw surveyed, in 2012, the range of innovations taking place around ICT usage in the WASH sector it was evident that the main drivers for water and sanitation stakeholders to adopt ICT fell into three broad categories[1].

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.

Figure 2: *Three main drivers for adopting ICT innovations in the WASH sector (Sattler & Schaub-Jones, 2012)*

Of these three, both of the first two are proving 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 (which we come back to in detail in the Tanzanian case study below) 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. This tallies with every of Emanti's experience in the last 10 years, and in particular in the roll-out of national systems engaging with all 152 of South Africa's municipal Water Services Authorities, such as the MuSSA and Munibench. Given the understandably crucial importance of user incentives, 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.

Emanti's work in South Africa (and SeeSaw's work across another 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.

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[1] These initial findings are being largely confirmed by an ongoing survey SeeSaw are – in conjunction with the International Water Association - conducting on a similar topic.

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.* *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 fall within this category.* *Instance 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. The adoption of new reporting templates or HR tools to improve efficiency also falls here.* *Scenarios in this quadrant are 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.* *Benchmarking processes also fall within this category.*
	Internal	**External**

Figure 3: *Main drivers for wanting better monitoring of water services*

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. When it comes to how ICT can play a role in this, 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 (and ICT) systems, we now look at some on-going work in the South African water sector. Emanti is currently working with both the South African Local Government Association (SALGA) and Water Research Commission (WRC) on a national water services benchmarking initiative. The Municipal Benchmarking Initiative (MBI) began in April 2011. The aim of the MBI is to harness both metric and process benchmarking processes to help municipalities measure, manage and improve their own performance – and, given the emphasis on gathering and comparing data, there is clearly a strong emphasis on monitoring.

Whilst, in some respects, the MBI is still early in the early stages (benchmarking initiatives in both the public and private sector generally take some 10 to 15 years to attain maturity), looking at the MBI offers an excellent opportunity to explore the drivers behind monitoring and the appreciate

consequences they have on efforts to introduce ICT into the WASH sector.

Guided by both the inputs of municipal practitioners (including team members IMESA and eThekwini Water and Sanitation) and the International Water Association's framework for water utility benchmarking, the MBI takes a bottom-up approach to supporting the self-development of the capabilities of municipalities to measure and manage their own performance, and to share this both internally and with their peers.   Importantly to note, the level of municipal participation in the MBI is voluntary.[3] Broad aims of the SALGA/WRC MBI are to:

(i) Support improved efficiency and effectiveness in water services delivery through comparative performance benchmarking, peer-to-peer knowledge sharing and iterative performance improvements,

(ii) Strengthen performance measurement, monitoring and management in municipal water services provision,

(iii) Build communities of practice within and between municipalities, and

(iv) Forge relationships of mutual respect and trust between municipalities and thereby strengthen the development of performance tracking, reporting and comparative assessment systems.

Given the "bottom-up" focus of the MBI to measuring the performance of municipalities and its voluntary nature, in respect to the framework presented in Figure 3 the drivers are largely internal. The idea is that strengthened reporting systems lead to improved management decision-making and oversight and this, in turn, leads to substantial improvements in service delivery efficiencies.

Where the driver for adopting improved monitoring is purely internal, it is clear that if motivation wanes, the platform will either not be adopted or will not have useful, timely and relevant information entered into it. Where the driver is external, a different dynamic applies – but again, if the water service provider does not appreciate the initiative or find it useful for their own purposes, the risk is that they only make a token effort to provide reliable or whole data. In either case the risk run is one of "*rubbish in, rubbish out*" whereby any decisions made on the basis of unreliable, out-of-date or incomplete data are, at worst, nonsensical and, at best, 'sub-optimal'.

Whether the drivers are internal and/or external, whether the primary motivation financial or efficiency-related, any effort to introduce a new ICT system (or, for that matter any new or amended monitoring system) is, at its heart, one of 'change management'. In this the MBI is no different, requiring, as it does, municipalities to both think and act differently.[4]

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[3] For municipalities, the key benefits of benchmarking are access to a support network of peers where they can share common experiences, achievements and challenges in a manner that enables improved performance. A key facet of the initiative is the provision of appropriate support to strengthen performance reporting systems and affirm their importance for effective service delivery.

[4] Organisations don't like change, and change introduces risk or requires focused effort. Many change programmes, however, fail before they start. For a change management process to be successful, it needs both high quality leadership and excellent management. In particular, a successful change process generally requires the following steps: 1. A sense of urgency/need; 2. A strong guiding coalition; 3. A clear and compelling vision; 4. Communicating the vision; 5. Empowering others to act on the vision; 6. Maintaining a pipeline of wins; 7. Consolidating improvements and producing still more change; 8. Institutionalizing new approaches

With this in mind, based not only on its experience with the MBI but with other initiatives related to monitoring and ICT, Emanti have found he following framework useful for engaging with user groups such as to best promote sustainable support for ICT based performance improvement efforts.
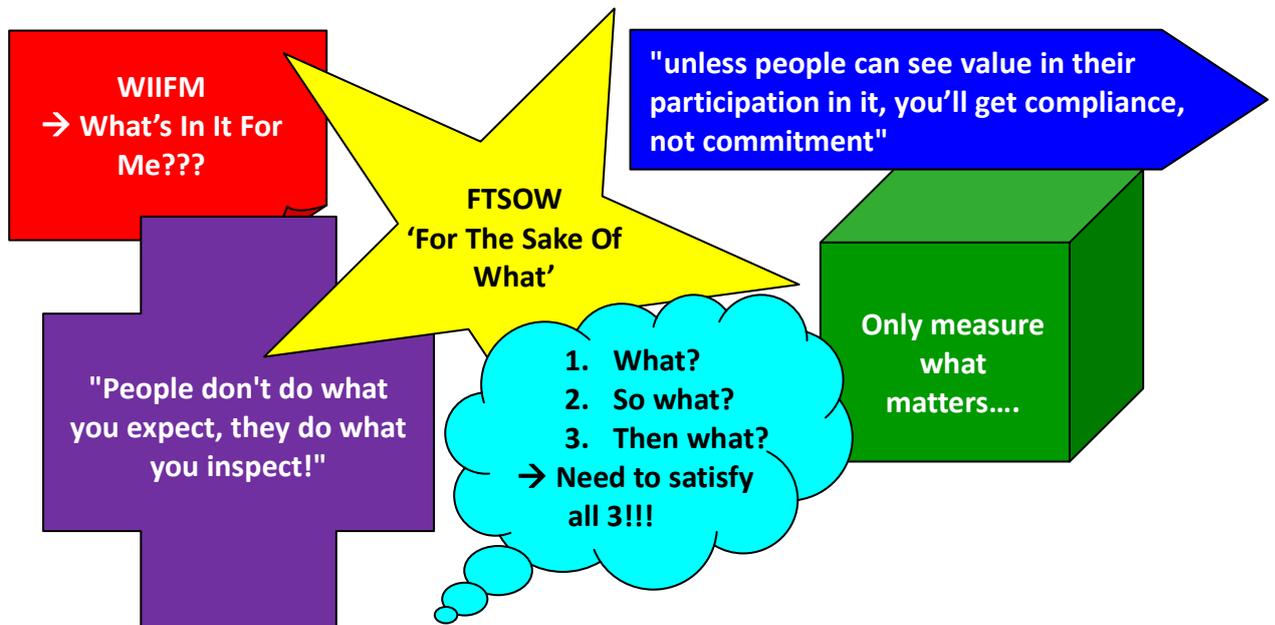

Fig 4: *Key sustainability checks for adoption and use of ICT based monitoring and performance management*

EMANTI's observation - based on its long track record of engaging with municipalities around monitoring and performance management in the water sector - is that if a municipality cannot answer these questions, or do not understand why they are participating, participation in any 'monitoring system' is hard to get underway and difficult to sustain in the medium- to long-term. Hence such questions were asked at the outset of the MBI's inception and are continually shaping the way MBI is progressed across the municipalities of South Africa.

To see how important it is to ask these questions – and to highlight the crucial need to both understand and plan around existing incentive structures, we now look outside South Africa at another initiative that looked to use ICT to improve monitoring – that of Maji Matone in Tanzania.

Maji Matone – a cautionary tale from Tanzania

In 2010, Daraja, a Tanzania-based NGO, launched a water monitoring and civic participation pilot project, called Maji Matone. Citizens in the included rural areas were enabled to report outages in their water system via SMS from their mobile phones to Daraja employees, who forwarded the given information to the district water engineer. If repairs were still delayed, local media partners were informed in order to publicize the lack of action.

After 6 months, however, Maji Matone simply did not get the level of citizens' engagement aimed for, with only 53 messages received instead of targeted 3,000. This left Daraja with the question why citizens hardly made use of the system. According to Daraja, the technology itself was easy to develop and not the issue. Due to considerable promotional work, lack of information by citizens about Maji Matone also did not explain the failure. In addition, the information provided by citizens usually led to quick action by the District Water Engineers, so in theory the system did actually work.

In trying to find answers, Daraja came up with three major challenges …

Matching technology to context

In the rural areas where the project was piloted, many small challenges might have had an effect on the project's success. Low literacy and education levels, poor access to information, problems with phone networks and limited sources of electricity for charging phones are all hurdles to be overcome when asking people to send messages. One possible conclusion thus is that at the moment the rural context is simply too difficult for this kind of 'crowd-sourcing'.

The world of water supply

The Tanzania Water Policy generally leaves communities with the responsibility for operation and maintenance of rural water infrastructure, with some support from the District Water Engineers. Knowing about their responsibility, citizens maybe were reluctant to send messages because they did not expect District Water Engineers to take action. Maybe the general confusion about institutional responsibilities also discouraged people from engagement.

In general, however, the understanding of rural citizens on the water policy is low, and the perception that government is responsible for water services still very widespread. Thus, it does not seem too likely that this reason was a major cause for citizens' low interest in the initiative.

Citizens' engagement, risk and apathy

In addition to service improvements, the program's goal was also about changing attitudes from acceptance of bad infrastructure to taking a proactive approach, thus transforming the relationship between citizens and their government by use of new communication technologies.

A widespread apathy and a low sense of entitlement are, however, amongst the main possible reasons for failure. After a long history of unfulfilled promises from government, NGOs and others, people maybe felt that there was no point in engaging and nothing would change anyway. In addition, although providers of information were kept anonymous, a project review found that people were still worried to earn a reputation for being a troublemaker.

One conclusion drawn afterwards was that the programme was perhaps too ambitious in trying to create a culture of citizens' agency in rural areas, whereas cultural changes tend to be driven by urban society (Source: Daraja, 2011).

Although it is difficult to draw definite conclusions of this example on what went wrong and could have been done to improve citizens' engagement, the diagram on in Figure 4 helps unpack some of the challenges.

Above all, it underlines the point that if people do not see value in their participation, you won't get commitment. In this case it was a voluntary initiative (internal driver to participate from those being asked to send in reports) hence compliance was not a consideration. Above all, it highlights the need to give individuals involved clear incentives to use the technology provided.[5]

This issue, that applies not just to customers, but also to technical staff – as incentives are a stronger shaper of behaviour - it is crucial to understand the motivation all needed stakeholders to use - or not use - a given technology.

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[5] The experience does gives future planners an idea of the many factors that have to be taken into account, particularly in rural areas. Finally, it also shows that many things actually have worked. The technology itself was no problem, most citizens were well informed about the programme, and by including the local media pressure was built upon the water engineers, who undertook repairs more quickly if only information was provided.

The rise and fall of eMWAP, South Africa

Our second case study looks back and allows some crucial insights on how useful ICT innovations become institutionalised and go to scale – or don't. Looking at eMWAP, an initiative started by EMANTI more than 5 years ago, allows us to consider the evolution of promising ICT innovations, introducing the concept of an "ICT Valley of Despair and Slope of Hope".
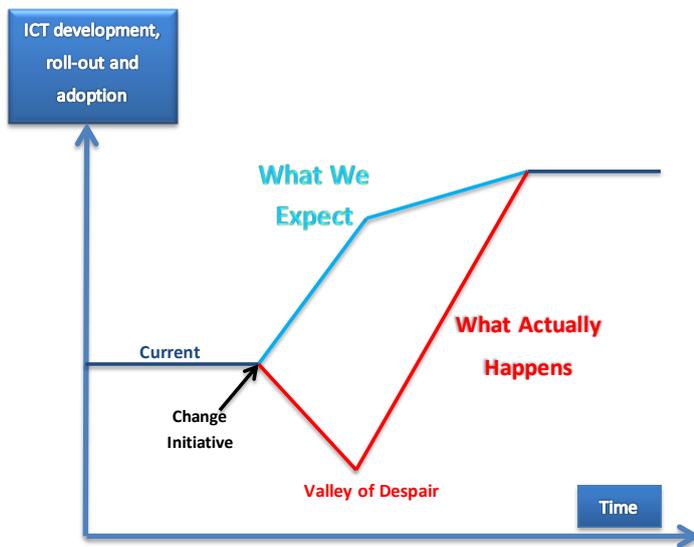
Expectations govern people's actions but the rollout of a new technology – as with any 'change initiative' is subject to a period where progress does not match expectations.

This can be for a variety of reasons, but the mismatch between the two often leads to the abandonment of projects, which could perhaps have had a significant impact, if only they had been able to overcome these challenges.

Fig 5: *The concept of an "ICT Valley of Despair and Slope of Hope" (to the right of the valley).*

In 2008 Emanti developed the electronic Mobile Water Application, eMWAP, as a cellphone-based water management application. Utilising Unstructured Supplementary Service Data (USSD) technology, and co-sponsored by a Wireless Application Service Provider, eMWAP was initially developed to aid with a few things associated with the management of deep rural drinking water quality including; water quality monitoring; the identification of water-related challenges, education of communities regarding water within their surrounding environment, and to provide a means for municipal staff to take responsibility for their water.

In remote rural areas capturing and relaying data on water quality is not easily undertaken, which contributes to concerns about health-related risks linked to poor water quality. The initial spur for the development of eMWAP was the realisation that not only was there a clear need for water quality management but that the wide spread of cellphones and cellphone networks, offered a new opportunity to address the challenge.

The initial focus for eMWAP was on relaying data around water quality from remote rural areas using cellphones. However it soon became clear that there was a broader need for effective water quality management, both in rural and non-rural areas. Making use of simple field tests kits (such as the H2S strip test/World Water Monitoring Day test kits) allowed rapid assessement of the water quality – this data could then be loaded there and then onto any model of mobile phone and sent to a remote server via USSD. The system could also be configured to provide immediate feedback to the user as well as relevant the managers and authorities, allowing issues of special concern to not only be immediately identified but easily alerted to others (who were then expected to engage and resolve these in a timely manner).

Following on from very positive piloting in both the Northern Cape and KwaZulu Natal, the technology was expanded to include water/environmental/health-related quizzes and surveys and

specific water-related technical content. The eMWAP website was configured so that immediate graphical and geo-referenced outputs were visible and easily available.

Yet despite a promising beginning, a sound technical approach and clear and immediate benefits (namely the ability for responsible parties to more easily monitor water/health/environmental sources on a regular basis and use the information to initiate effective and immediate responses) the uptake of the eWMAP system after the first few years has been very slow.

Looking back at the early innovation and its evolution (or not) in the following years, it is apparent that two unexpected developments served to challenge and ultimately retard its widespread adoption (and, linked to this, its commercial sustainability as a 'service' to water sector stakeholders):

Firstly, perhaps inspired by the early success of eMWAP, a university-linked study was launched that developed a similar tool. This tool, supported for the duration of the project by an externally-funded research team (effectively 'free' to the stakeholders on the ground), was perceived by some as a more modern (and "sexier") alternative and – as events unfolded – started to 'compete' with eMWAP both in terms of what it did and who its likely users were.

Secondly, a large international foundation took steps to develop and trial a far superior "field test" to the H2S. Although this was still a testing a pilot phase, the emergence of this initiative created significant uncertainty amongst potential eMWAP early adopters, who took away the idea that a better alternative might be "just around the corner".

Together these developments combined to create a significant degree of uncertainty amongst those sponsoring the development and roll-out of eMWAP – with key stakeholders now unsure whether the eMWAP approach (both from the perspectives of its ICT technology choice and its means of conducting water quality field tests) was the appropriate way to go. Unfortunately, six years after the initial development and early success of eMWAP neither of the other initiatives has lived up to some of the larger expectations. The technology developed by the University-linked project worked well on the ground but there was no significant driver to take forward its adoption by the needed stakeholders. Partly as a consequence, the 'user-base' remains small and the momentum to drive its adoption at scale is largely absent. The foundation-linked water quality field-test is not yet commercially available and there is no supply chain to get this more 'advanced' technology and its associated products out into the rural areas that eMWAP was focussed on. Yet the mere presence of these innovations – and the uncertainty they created about which option to take – have meant that eMWAP has not yet emerged from the 'Valley of Despair' to hit the 'Slope of Hope'.

One of the takeaway lessons is around the uncertainty in picking the 'correct ICT choice' especially given the rapid pace of technological development (which brings confusion) and the disparity of what can be done in the lab or the office versus what is robust enough to work in the field (especially if widespread adoption is needed). Both for those who seek to drive ICT innovations (including monitoring systems) and those being asked to use them (for instance managers who have to adopt a new way of working) this uncertainty can be extremely challenging.

KEY LESSONS LEARNT

In addition to the aforementioned, and between their own and others' experience, SeeSaw and Emanti have had the opportunity to learn many lessons – on how successful monitoring initiatives can be put in place – and how ICT can assist with those. A selection of the key lessons would include:

1. User-centric design

Understand the motivations for key stakeholders in adopting a monitoring tool and design it so it delivers 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.

2. 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 is 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.

3. Understanding incentives

Incentives are important at a few levels. Any system is only as good as the data being fed into it. 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, is 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?

4. 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 pose too great a burden on those being asked to provide it. It can 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 project benefit from an iterative approach to design and development that encourages short and frank feedback loops from real users.

5. 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?

Lastly, in a context such as the municipal environment, where there is often high staff turnover and competing priorities, on-going and continuous reinforcement is required. This effort, in time and money, also must be planned for.

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 and Emanti'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 Tanzania, South Africa and Mozambique (see Annex One) 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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ANNEX ONE: DESIGNING A NATIONAL MONITORING SYSTEM FOR SMALL WATER SCHEMES IN MOZAMBIQUE

SeeSaw is helping CRA design and pilot a monitoring system for small water schemes all over Mozambique. CRA, which stands for Conselho de Regulação do Abastecimento de Água, is the national regulatory body for the water sector in Mozambique. 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 that can be quite remote from CRA's head office in Maputo.

After participating in a workshop SeeSaw co-hosted with the University of Cape Town, CRA invited both organisations to Maputo to provide structure training on the use of ICT for monitoring to a range of stakeholders in the country. SeeSaw is now acting as a strategic advisor as CRA plans a system that will help relay information from its agents in remote places, that will collect monthly operational data from water operators and that shall also capture both customer complaints and the official response to them.

How are CRA and SeeSaw applying some of the lessons outlined above?

User-centric design & change management
➢ Full mapping of existing information flows and structured appraisal of what benefits are being sought, at what level of the system will accrue and where the crunch points (where the costs of the new system risk outweighing the benefits) accrue.
➢ 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.
➢ Attempt to build on what good practice and 'organic systems' of data collection and transmission already exist.
➢ Attention being paid to how quick wins can be generated and communicated to those within the system

Understanding incentives & focussing on most important issues

➢ Looking closely at the incentives of key stakeholders to put in reliable information and what their motivations to either adopt, ignore or undermine a new reporting system might be.
➢ Strategies to address these incentives being developed – a pilot project to test our initial assumptions around these and a process of iterative design to improve the initial ideas.
➢ Categorising what is 'important' from what is 'nice to have' and try to design the system such that it asks for little data at first but can easily grow from early success.
➢ 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

➢ Asking 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
➢ Looking 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.

ANNEX TWO: MUNIBENCH AND THE MUNICIPAL BENCHMARKING INITIATIVE (SOUTH AFRICA)

South Africa's national Municipal Benchmarking Initiative (MBI) for Water Services Authorities (WSAs) is a performance improvement benchmarking initiative, and was mentioned in body of the paper.

The ICT aspect of the MBI is that the MBI uses a web-based real-time data-capture and reporting system for tracking and measuring performance (i.e. Munibench – www.munibench.co.za.) The Munibench underscores the data based "metric benchmarking" component of the MBI and generates MBI Performance Scorecards for each WSA, provides performance management dashboards for each WSA, facilitates a range of local/regional/national data analysis, and generates an annual National Benchmarking Report. The ICT / metric benchmarking aspect is supported by the equally important and powerful process benchmarking, which is based on municipal learning and support amongst the associated MBI peer network.

A significant MBI and ICT consideration is the wide range in participant circumstances, i.e. from major metros (like City of Cape Town) to rural District Municipalities (like Chris Hani). Also, involvement in this initiative, and most especially effort expended by the 152 WSAs, is primarily voluntary.

How are Emanti and the project sponsors applying some of the lessons outlined above?

User-centric design & change management

➢ Mapping of existing municipal and sector level information flows. Aligning to existing data collection and transmission processes.

➢ Participatory design of the system – most importantly via key municipal-user types. i.e. seek to ensure municipal appropriate solutions ("bottom-up" inputs, buy-in, ownership by municipalities)

➢ Build on existing international good practice (IWA Benchmarking Framework) yet allow for "Africanisation" by municipal engineering user groups.

➢ Seek to identify and provide "low hanging fruit" from within requests from user groups.

➢ Support a modular, tiered approach to benchmarking to encourage and enable all to participate, at a level aligned with their current capabilities and future aspirations.

➢ Data/information gathered through the modules is considered as basic, intermediate or advanced, and is based on the ability of the municipality to accurately collect and manage the data. Municipalities can therefore choose at what level they would like to participate (e.g. Basic, Intermediate or Advanced).

➢ Enhance change management aspects via seeking clear national leadership from SALGA and WRC.

➢ Support existing good practice (positively engage good practice and develop towards full legislative compliance)

Understanding incentives & focussing on most important issues

➢ Study carefully the incentives of municipalities to use Munibench and put in reliable information.

➢ Support early stage adoption by sourcing/obtaining/storing/utilising/and improving the existing municipal data sets and avoiding duplication of data.

➢ Focus on essential/priority areas of services delivery in the South African context, i.e. six initial modules: (i) product quality, (ii) service delivery and backlogs, (iii) operations and maintenance, (iv) human resources and skills development, (v) water conservation and demand management and (vi) financial performance.

➢ Respond to development requests from user groups which indicate what is 'important' to their business.

➢ Design system to be able to start data lean, yet data growth compatible.

Sustaining the system over the long-term

➢ Entrench on-going user prioritisation of system requirements to meet Municipal appropriate solutions ("bottom-up" inputs, buy-in, ownership by municipalities)

➢ Determine from users as to "value add" of system and phase in a "user pays" approach.

➢ Looking 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.)

➢ Live the mantra "IT supports business" (tools introduced must provide positive value to users)

➢ Prioritisation of municipal water services requirements (what is needed and where is it needed)

More information on the MBI initiative can be found in the WISA 2012 paper; Moraka W, Bhagwan J, Mackintosh G and Stevens F: *Improving Water Services Provision through the National Municipal Benchmarking Initiative* presented first at the WISA 2012 Conference in Cape Town.