WIN-SA

**WATER INFORMATION NETWORK
- SOUTH AFRICA -**

"Making knowledge work for us"

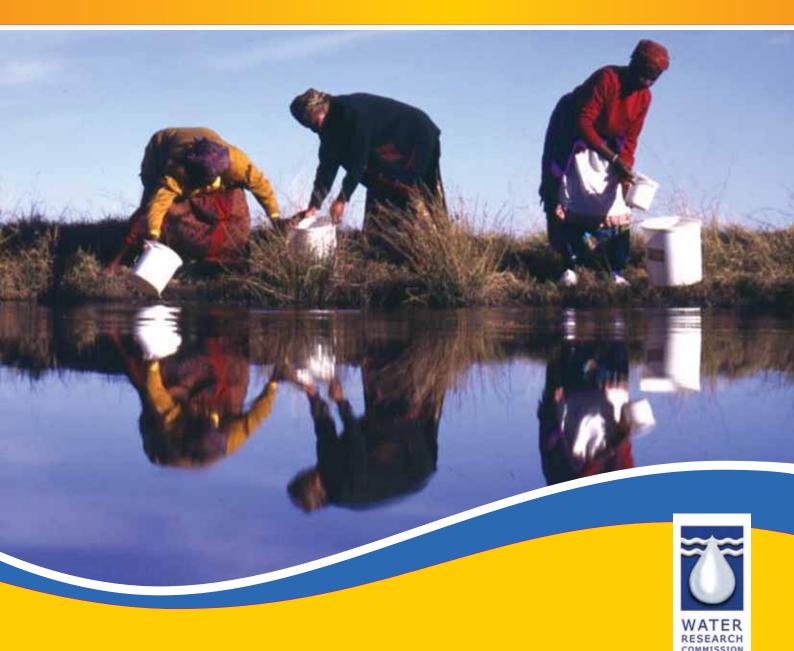# ICTs IN THE WATER SECTOR
Issues and Lessons

WATER RESEARCH COMMISSION

1. — Introduction

Over the last decade Information and Communications Technologies (ICT) systems have become known as a potential solution for developing countries and their information needs.

The wide distribution of mobile phones in even the most rural environments has created the suggestion that cellphones are far more than a mere communication tool. Cell-phone systems used for data collection, mobile payment and crowd-sourcing initiative to improve governance and other applications are offering a new way of using technology to improve access and might have the potential to improve service delivery.

The WASH (Water and Sanitation and Hygiene) sector has also seen an increase in ICT applications mainly for the purpose of improving data collection, information flow between decision makers and engagement with the wider public.

A WRC research project assessed the status-quo of ICT solutions in South Africa. The aim was to understand in more detail the potential for ICT in the South African water sector, to learn from the successes and failures of existing systems and understand the enablers and barriers for ICT implementations.

Key questions analysed included:
- What can we learn from ICT projects in related sectors?
- What is the status quo of mobile applications in the water and sanitation sector?
- Does smart metering or smart grid technology provide real cost-effective benefits?

The study focused on stakeholder survey of water sector practitioners and experts in order to contextualise the findings from the literature review.

2. — Key Results

i.   ICTs in the Water Sector

Over the last five years there has been a substantial increase of ICT usage in the South African water sector. Broadly, the applications currently implemented, in development or envisaged can be categorised into Customer Management, Operational Management, and Financial and Control Management. In all of these areas, ICT applications are used to collect information, streamline information flow and improve work processes. The majority of the systems highlighted as successful showed two key aspects, namely, the system integrated into existing structures and the municipalities had made financial commitments to maintain the system.

The following key issues were noted:

- The mobile water sector has is rapidly growing and has shown a multitude of different projects being attempted in different countries with unclear success levels. Findings showed that experts in the field have fairly healthy doubts about the actual benefits offered by these

mobile systems, and the long-term sustainability and the "wear-off" factor of new (sometimes unproven) technologies. The concern is that ICT systems may in the long-run prove to be a fancy term for projects with little impact connected to high cost – particularly in the case of mobile systems.

- Integration with existing systems is of great concern. Municipalities, stakeholders, and private organisations have invested substantial money to develop and maintain current systems. The concern is that a new system might result in data duplication and reconciliation issues, as well as increased costs due to having to retrofit or redo old systems wholesale.

- Survey participants highlighted that access to services for all and sustainable water resource management are key issues for the water sector in South Africa. Issues of affordability and sustainability versus maintenance of infrastructure and urban development were also identified as important concerns. The rapid expansion and growth of developed areas has resulted in infrastructure failing to deliver and participants highlighted the limited data as one of the key issues to preventing accurate planning and response to these challenges on the ground.

- There is a perception that municipalities or at least people in decision-making roles in municipalities hesitate to make decisions on new or untested systems. This makes government agencies increasingly uncompetitive (in terms of staying up to date with technology) as the risk of failure is too high to justify an attempt.

- Barriers to solving challenges in the sector were identified as institutional challenges (poor management of different sectors within a municipality, and poor planning), educational, financial, political interference, budget delays, and social challenges of awareness and acceptance of technologies and processes.

- Working ICT systems cannot always be scaled since they are typically designed for a particular context during their initial stages. This is particularly true for systems that are developed with the users being co-designers to the system, as users are intrinsically linked to the context in which they currently find themselves.

- Many of the challenges in the water sector cannot be resolved with ICT systems alone. An improvement of information flow is of little use when it is not possible to act on the new information due to resource or budget constraints. The literature and survey findings confirmed that aspects such as institutional shortcomings, resource constraints, and other management issues cannot be solved solely through ICT systems even if the ICT system is the provider for information on the shortcomings.

ii.　　Current ICT practices in South Africa

The relative youth of the ICT sector, lack of formal frameworks or regulatory bodies, and misidentification of systems (i.e. not classified as ICT) has led to a situation where it is hard to evaluate or even identify ICT systems in South Africa. This can be seen as largely an awareness and understanding shortcoming as it is apparent that government agencies use a variety of complex IT systems to run various aspects of service delivery yet these are not reported on, and there is little to no academic work on the subject.

Key issues noted included the following:
- Analysis shows that there is no common best practice or an understanding of best practice within the ICT sector.

- There is no body or organisation that is seen by stakeholders as performing a regulatory or advisory function.
- Some of the participants who are in the field were not at all aware of any other people or organisations in the sector doing any kind of ICT work.
- Initiatives are started within municipalities and often managed and implemented by consultants. These initiatives become all-in-one solutions for municipalities and leave little room for smaller, more agile projects to take root. Additionally these initiatives are kept in house and ill-reported.

iii.   Stakeholder expectations, experiences and needs

ICT systems are envisaged to improved information processes, leading to increased sustainability and efficiency for projects and users. Yet some survey participants spoke of reluctance towards new systems due to high costs, but at the same time mentioned that aspects such as data gathering (through mobile data collection) were considered to be cheap, quick solutions. This illustrates that there is currently little knowledge of the cost- benefit of ICT implementations, which can be ascribed to the non-existence of such analysis in the literature and the sector as a whole.

The following views on ICT systems, the water sector in South Africa, and government involvement in projects were noted in the study:
- The monitoring of projects and interventions is made easy through remote data collection.
- Municipal feedback suggests that the South African government is perceived to be ready for implementation of new technologies, "as long as such implementations are not politicised", but,
- feedback from consultants/private individuals states that they do not believe the government is ready for implementations of new technology, as it becomes available.
- Trying to develop and make use of multiple separate systems within one municipality results in information and data chaos – work processes and data flow have to be planned and finalised before any ICT implementation starts.
- The experience exists that there are systems and tools available but that the implementation is lacking due to the perceived cost versus perceived benefit ratio. Participants felt that the "high initial costs are not contrasted to long-term savings." The perceived cost of implementation and maintenance was raised as a key issue by all participants.
- Systems are expected to automate processes and to manage all aspects of the WASH sector, such as laboratory systems, asset management, engineering system, back-office admin and revenue protections. All sub-systems are expected to be integrated into one overall management system.
- It was felt that government departments may not see a reason to implement or even use a new system, as:
- Government has no incentive to constantly innovate (compared to the private sector); departments cannot afford to fail by implementing new and untested technology so would rather stay with a conservative approach in order to minimise risk. This is seen to be one of the reasons why there is a faster turn-around and adoption of ICTs in the private sector compared to the public sector.
- There exists the possibility that there is a perception that ICT systems eliminate jobs through automation.

- Vandalism of new technology can de-rail projects (e.g. smart meters).
- Mobile phone applications are an example of a "pass-the-parcel" attitude to taking responsibility at government level, i.e. by decentralising further and further down the actual responsibility is handed down to a context that is less likely to be able to implement successfully.
- Tail-wagging-the-dog- scenario: a drawback of technology dependency is that whilst it is becoming an integral part of our lives, it cannot become the reason to develop new systems and structures (i.e. simply for the sake of having a new project).
- ICT systems can be a simple solution based on affordability and accessibility, but assistance in the implementation is needed and in the long run the financial sustainability depends on similar strategies that have to be developed to maintain the traditional IT systems. This is still a major challenge for the rural and under-resourced municipalities as can be seen from the limited amount of IT based management systems used in these environments.

iv.   Enablers and barriers to ICT

The following significant barriers to ICT adoption in the country, and the enablers of successful projects rollouts, were identified. Perception of a barrier or enabler (whether it exists or not) is critically relevant because it speaks to the buy-in aspect of projects. That is to say, without appropriate buy-in, it is relatively easy for even a single person in a decision-making position to derail a project.

Barriers to successful ICT adoption
- Misuse of the technology – in this example it was thought that project participants might use the technology (mobile phones) for things other than project work (not aligned with the funders' aims and goals)
- Bureaucracy of procurement
- Failure to correctly understand project incentives
- Project coordinations or managers might see that more data results in more work and more responsibility in an already constrained environment
- Uncertainty about how much effort it will be to use the new system, e.g. how long does it take to actually enter the data?
- Projects becoming politicised and judged on merits other than the appropriate ones (technical and social success)
- Research and evaluation of projects or technologies not conducted in a rigorous manner – leads to doubts about the actual usefulness of systems. There is no proven method or framework to analyse projects for success/usefulness.
- The lack of long-term evaluations of projects also contributes to a feeling of uncertainty or ill-ease, coupled with projects not sharing results or findings.
- Financial concerns including the initial outlay for a project, as well as projects susceptible to being shutdown when money runs out
- The tendency to stick with what works and avoid risk by managers, and users resisting change because "this is not how I am used to doing it"
- Shortage of technical skills, or even technical literacy
- Infrastructure shortages – electrical and network connectivity
- Misunderstanding of project requirements or goals – communities can tell you what is wrong, but are not necessarily able to suggest a viable solution (partially due to not knowing what is possible)

Incentives and enablers to successful ICT adoption

- An increase in job satisfaction and status could be used as an incentive to encourage uptake of a new system, similarly the potential gain of technical skills is a valuable incentive

- Getting away from paper-based or traditional systems – "paper is a pain," said one participant

- A consistent record of information that can be used for accountability and transparency purposes is a significant draw card

- Leveraging the perception that IT systems enable better and more efficient collection and management of data

- Having a project champion that can engage at multiple levels of the organisation is a very significant factor in enabling project success. This is a double-edged sword though as a project could be seen to be successful due to its own merits when in fact the champion was carrying it the entire time

v. Research needs and water sector strategies for ICT

In terms of research needs that should be focused on in the future in order to best prepare the country for successful implementation of information systems, it was suggested that there is a need for a set of "best practices" – something that can be consulted before starting a new project, to inform decisions and help decide the appropriateness of the proposed solution.

Accompanying this is the need for solid and dependable advice on how to implement and develop systems in such a way that they will be sustainable and able to withstand a variety of setbacks.
It was also felt that research is often too generic and not entirely applicable to the private or public sectors (ivory tower syndrome).

Another issue is that there is no direct connection between academia, industry, and the government, and without this link the three parties are unable to effectively communicate their needs and experiences to each other. This raises the issue of how to create a research stream that can remain academically rigorous but still be accessible to practitioners on the ground.

3. — Conclusions

The analysis of past and present ICT project in the water sector and related fields has shown that ICT development and implementation is complex and its success and failure are dependent on three dimensions:

i. Social Design – this comprises the social component of an ICT design. Aspects such as the social context of the implementation, organisational structures, stakeholders and the way in which information is shared are key concerns in this dimension.

ii. Technical Design – the system appropriateness and technical correctness for the problem at hand

iii. Program design – the support structure for scalability and sustainability of the project

There is a clear experience that ICT can assist in management functions of the WASH sector and the literature is optimistic about the value of ICTs in terms of development and incorporation thereof into the various development sectors, but conclusive proof of such assertions, however, remains elusive.

Recommendations for future projects and research that would be of benefit for the ICT sector in South Africa:
   i.   Development of a framework to analyse ICT projects in order to allow long-term evaluations and impact assessment of ICT projects
   ii. In-depth investigation to map the current IT practises within government which would allow a clearer understanding of the current use of IT as well as the strategy and vision for the future.
   iii. 3. Developing an ICT community to connect networks across different sectors, such as academia, government and industry.

ACKNOWLEDGEMENT

The WIN-SA lesson series aims to capture the innovative work of people tackling real service delivery challenges. It also aims to stimulate learning and sharing around these challenges to support creative solutions. To achieve this, the lessons series is supported by ancillary learning opportunities facilitated by WIN-SA to strengthen people-to-people learning.

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This document hopes to encourage ongoing discussion, debate and lesson sharing. To comment, make additions or give further input, please visit www.win-sa.org.za or send an email to info@win-sa.org.za.

Our mission is to ensure the body of knowledge in the sector is well managed, readily accessible and applied, leading to improved decision-making and performance, especially of local government.

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