Design and Implementation of an ICT system for Community Engagement in Drinking Water Supply Management

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by

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EXECUTIVE SUMMARY

Background

In the past decade, the South African water sector has gone through substantial change to address the disparity of access to potable water, the shortcomings in water infrastructure development, and the adherence to water quality standards. Despite these attempts, recent service delivery protests relating to water and sanitation have highlighted the unsatisfactory communication between municipalities and communities, which has resulted in a lack of trust and constructive engagement. This study was based on the premise that community engagement is paramount to water supply management and sanitation provision. The research proposed an investigation regarding the use of information communication technologies (ICTs) to engage rural communities in water supply monitoring and the reporting of service faults.

Aims

The aims of the project were as follows:

1. To identify successes and failures of incentivising community engagement through a detailed literature study.
2. To develop a research methodology to analyse engagement between municipalities and communities.
3. To analyse and assess current practices of community engagement in field study sites.
4. To identify incentives for reporting supply problems in collaboration with the community and the municipality.
5. To design, develop, implement and evaluate an ICT tool, as well as incentive structures, and observe the use of the system for six months.
6. To identify enablers and barriers to the use of ICTs and incentives based on the findings of the field study project scope and limitations.

Methodology

The project design was based on using action research in a case study setting with the intention of developing an ICT intervention. To design the ICT, a co-design approach was chosen, which required the community and the municipality becoming a resource in the research project and taking an active part in the design of the tool. Using several rurality criteria, two local municipalities in the Eastern Cape were identified as the case study locations, namely, Kou-Kamma and Ndlambe. Both local municipalities are water service providers to their communities and exhibit the relevant criteria for being classified as 'rural'. In each of the municipalities, three communities were identified as case study sites.

The methodology for the evaluation of Amanzi was done using the Technology Acceptance Model described by Davis (1989). Perceived usefulness and perceived ease of use were evaluated to understand how the system was used in the municipality. In order to analyse the impact of the ICT intervention, communities and municipalities were assessed using the above-mentioned methods prior to the implementation, and again six months after the implementation in order to assess the impact. To fulfil the ethical requirements for the study, the names of the municipalities were anonymised to Municipality A and Municipality B, while the communities within the municipalities were referred to as A1, A2, A3, and B1, B2, B3.

iii

Results and Discussion

The analysis of the municipalities prior to the ICT implementation showed that both municipalities did not engage productively with their communities. A lack of communication and feedback mechanisms were identified as a hindrance to inform citizens appropriately. The expectation of the ICT implementation for both municipalities was that it would improve internal communication and engagement with the communities by building trust. Communities experienced limited engagement prior to the ICT implementation and reported frustrations resulting from slow responsiveness on the part of the municipality. This lack of feedback damaged the trust that communities had in the existing communication and engagement structures, weakening the relationship between municipality representatives, such as ward councillors, and the communities.

The ICT tool was designed using the feedback from communities and municipalities in order to address the identified communication issues. A toll-free line was established to allow a cost-free complaints registry. A please-call-me line allowed citizens to use their mobile phones to request a return call from the municipality. The requirement to provide feedback to citizens on complaints logged was addressed by revising the process for lodging complaints in cooperation with the municipalities.

Access to the web-based system was given to the relevant stakeholders, including councillors and community development workers. In November 2014, the system was implemented in Kou-Kamma and Ndlambe accompanied by training workshops in each municipality. The communities were informed of the system through public meetings, focus group sessions and pamphlets.

A total of 834 complaints were logged within the six-month period, of which 429 originated from Municipality A and 405 from Municipality B. Municipal staff reported positively on the perceived usefulness and ease of use of the system. Both municipalities adapted the system from the original design to better match their needs within the first two months of the implementation; neither municipality remained with the originally designed process of providing feedback to citizens.

Municipality A elected to use the system as a database to collect complaints as opposed to a real-time tracker of ongoing issues. This change to the originally designed process was due to the municipality realising that resources were not available to log complaints as they occurred. Additionally, Municipality A decided not to record contact numbers of complainants resulting in the community members not receiving feedback on the raised issue.

Municipality B performed better in providing feedback to citizens, which was ascribed to a complaints process being in existence prior to the system implementation. Overall, both municipalities were equally constrained by the financial resources in the use of the system but adapted it to suit their own workflow processes. The municipalities did not commit to the idealised process of providing feedback to citizens, which resulted in the system providing more benefits to municipal staff than communities.

Conclusion and Recommendations

This project showed that ICT systems can support complaints management in municipalities and can result in a measurable improvement. However, the impact and the improvement are arguably not significant enough to leave either the municipalities or the communities in a better position to adapt and respond effectively to the changes. This does not necessarily mean that an ICT tool is not useful to improve the municipal processes, but implementing any system in a rural resource-constrained environment should be done cautiously, focusing on the changes that can be achieved when considering the resource limitations. An ICT is not a guaranteed solution to a difficult problem, but can compensate for resource limitations that result in water and sanitation issues not being addressed. The study highlighted that Amanzi improved the overall knowledge and data tracking, but could not improve the effectiveness with which complaints raised by citizens were addressed.

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CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF ABBREVIATIONS

ASU	Actual Systems Use
DWA	Department of Water Affairs
DWAF	Department of Water Affairs and Forestry
DWQ	Drinking Water Quality
ICT	Information Communication Technologies
PAR	Participatory Action Research
PCM	Please-Call-Me
PEOU	Perceived Ease of Use
PU	Perceived Usefulness
SABS	South African Bureau of Standards
SALGA	South African Local Government Association
TAM	Technology Acceptance Model
UCT	University of Cape Town
WRC	Water Research Commission
WSA	Water Service Authority
WSP	Water Service Provider

1 BACKGROUND

1.1 Introduction

In the past decade, the South African water sector has gone through substantial change to address the disparity in access to potable water, the shortcomings in water infrastructure development, and the adherence to water quality standards. Despite an overall improvement of water service delivery countrywide, rural communities are still lagging. A number of reasons ranging from resource and skill limitation to the geographical dispersion and physical distance between villages and towns have been explored to explain this phenomenon (Rivett et al., 2013).

Within the growing body of research on water management, it has been observed that reporting of water delivery faults is limited, or even non-existent, in underresourced rural communities. Similarly, even in major metropolitan areas, there is clear a difference between the numbers of complaints logged in affluent areas compared to those in underresourced communities (Rivett et al., 2013). This is thought to result from a variety of factors, including ignorance of the complaints mechanisms available to citizens, a less empowered citizen structure, and complex relationships between water service providers and citizens. It has been noted that citizens may avoid blaming or pointing out non-performances of government or municipal officials, further hindering the identification, and subsequent resolution, of service delivery problems (Rivett et al., 2013).

This study is based on the premise that community engagement is an important component of sustainable water supply management. Such engagement serves a dual purpose: It provides an avenue to establish the needs of communities and, equally importantly, it ensures the buy-in and trust in systems developed by government authorities to deliver these services. Active community engagement relies on communities wanting to engage and contribute to the management and governance of services, and on governance structures proactively seeking such engagement and responding to it appropriately.

One of the hindrances to community members reporting their water supply faults has been their limited understanding of the roles and responsibilities of local and district municipalities. Community members are unclear whom to contact, and are disillusioned when there is no response to their complaints. Attempts to address this lack of feedback through mechanisms such as using complaint reference numbers to follow up logged calls is rarely understood. It is perceived by communities as an obstacle to the process of raising a complaint rather than being an aid. Metropolitan areas have a big disparity in the numbers of complaints logged in affluent areas compared to underresourced communities (Rivett et al., 2013).

Information communication technologies (ICTs) have been shown to offer new ways of engaging with the wider public on aspects such as governance. Over the past ten years, there has been an increase in literature suggesting such possibilities in the water, sanitation and hygiene sector (Champanis et al., 2013). The proliferation of mobile phones in developing countries specifically pertinent to this study, within the rural areas of South Africa, could result in ICTs contributing to overcoming the existing barriers of reporting water supply interruptions.

This research project proposed an investigation into the use of ICTs to engage rural communities in water supply monitoring and reporting of faults. To assess whether and in which ways rural communities would use such tools and what the appropriate incentives for the usage would be, an ICT system was developed and implemented in two rural municipalities with six small towns. The system usage was observed for six months, and data regarding engagement, system usage and response to complaints were monitored and analysed.

1.2   Project Aims

The research team identified the following project aims, which are discussed in greater detail below:

1. To identify successes and failures of incentivising community engagement through a detailed literature study.
2. To develop a detailed research methodology based on the findings of the literature study.
3. To analyse and assess current community engagement in drinking water supply of three research communities.
4. To identify incentives for reporting supply problems in collaboration with the community and the municipality.
5. To develop and implement a mobile phone tool as well as incentive structures and observe their use for six months.
6. To identify enablers and barriers to the use of ICTs and incentives based on the findings of the field study project scope and limitations.

Aim 1 identified the successes and failures of community engagement in rural governance, incentivising such engagement and the use of ICTs to facilitate engagement through a detailed study of relevant literature. This literature review is presented in Chapter 0.

Based on the findings of the literature review, a research methodology was defined as Aim 2, which is presented in Chapter 0.

For Aim 3 and Aim 4, three municipalities were identified as potential participants for the study. These participants were selected based on a set of criteria highlighted in the research methodology. A qualitative survey was conducted with community members, councillors from the selected rural municipalities and officials responsible for delivering water services being interviewed. Incentive structures were developed in collaboration with the communities and municipalities. A number of research communities were reviewed, resulting in two local municipalities and six research communities being identified for inclusion. This section is also presented in Chapter 3.

After collating the data from Aim 3 and Aim 4, an ICT application, coupled with a toll-free line and please-call-me (PCM) service, was developed for community members to report problems with water supplies. Part of the design was to ensure that the intervention integrated the identified incentives. The application was monitored over six months to gain an understanding of use patterns, information received and the drop-off once the novelty of using such a tool had worn off. During this period, several workshops and interviews were held with the municipalities to understand the reactions to the additional information received from communities. The results of this analysis address Aim 5 and are presented in Chapter 4.

After the six-month period, final interviews were held with all participants to obtain additional data on the experiences itself. This survey was qualitative and engaged the same groups that had been used in the beginning of the study. The qualitative data was supported with the data received on the server through the ICT application. An analysis of the data and the findings are also presented in Chapter 4.

1.3   Project Limitations

The project design was based on using an action research method in three research sites. Owing to budget constraints, it was important to identify a site that was close to the research teams to minimise travel costs. The district municipality of Cacadu in the Eastern Cape of South Africa was approached to identify sites since it fulfilled the requirements of a rural municipality as per the research method. The district municipality identified three local municipalities, namely, the Kouga Municipality, Kou-Kamma Municipality and Ndlambe Municipality. Both Kou-Kamma and Ndlambe municipalities became participants in the study and each identified three small towns where they requested the system to be tested. This resulted in the site selection changing from an intended three areas to six areas. In order to ensure that the local municipalities benefitted from the research, it was felt that a choice of sites had

to be made in collaboration. The municipalities therefore had the benefit of assessing three areas each. The increased number of sites also resulted in an increased number of data, which was beneficial to the robustness of the study.

Selecting participants in action studies is often difficult since engagement is a key requirement to collect rich data. While the research team endeavoured to interview the originally intended number of participants and keep the group similar, the realities of selecting members, identifying dates for meetings and the varying agendas often made this an impossible task. Within the analysis of data, the shortcomings are discussed for each of the sites. During meetings with community members, the view was expressed that participation in studies such as these should be remunerated financially. The research team explained that participation was voluntary and that no financial reward would be paid. However, it has to be appreciated that when entering communities with high unemployment, requests like these will occur. It requires collaboration with the relevant authorities to discuss these matters with the community. It is not possible to determine whether and in which ways the non-payment had an impact on the study.

The design of the ICT solution was affected by the co-design approach that had been chosen. While it had been the intention to design a mobile phone application, the engagement with communities and the municipality showed that this was of lesser importance than developing a simple but effective complaints system. In order to respond to local needs, the design of the system was changed ad hoc, which resulted in a very simple but effective system that was more applicable to the local context.

The municipal election in 2014 resulted in a delay of the project. The local municipalities advised avoiding interviewing communities in the run-up to the election since it could result in the research team being perceived as having a political agenda. The project was therefore extended by approximately three months, which resulted in a deviation from the original project plan.

1.4   General Approach

The project is grounded in a field study, where the researchers intend to understand context, but with the clear goal of intervention to improve existing practices. The research of the community and municipality is not a goal in itself – the intervention is a key component to achieve development. Based on this understanding, a participatory action research (PAR) paradigm was chosen. PAR requires that the researchers engage actively with the community and municipality under study (Denscombe, 2010). Often this results in research objectives changing throughout a study since the researcher adapts objectives based on the findings that were previously not identifiable. As highlighted in the project limitations, a flexible attitude is required throughout the project as the result is of greater benefit to all parties involved in the study.

The approach of the research team toward the study was also reflected in the design of Amanzi, which was based on a co-design method. This method accepts the user of the system to be an expert on local context and application purpose, and therefore the researcher becomes a reflective listener rather than an advisor.

The research team applied for ethical approval from the University of Cape Town (UCT) prior to engaging with municipalities and communities. Approval for the study was also received from both municipalities. The study was explained in detail to all participants with the help of translators where necessary. Consent was requested prior to any engagement. In the analysis and findings section of the report, the names of the municipalities and communities were anonymised to comply with the ethics requirements.

Municipalities and communities received feedback throughout the study and have been given access to this report.

2   LITERATURE REVIEW

The literature review that follows focuses on water service delivery, community/public engagement, and the role of ICTs in service delivery. The review is an excerpt of a detailed and comprehensive review presented to the Water Research Commission (WRC) as a separate report with the title: "Community Engagement in Drinking Water Supply Management: A Review TT 583/13".

2.1   Water Services Delivery in South Africa

The water sector in South Africa has been through a substantial restructuring process since 1994, which included updated water acts, developed water policies, and restructured water resource management resulting in significant institutional changes (Lindfors, 2011); (Hudgson & Manus, 2006).

In the White Paper of 1994, the goal of the Department of Water Affairs and Forestry (DWAF) was defined as ending the inequity in access to basic water supply and sanitation service (DWAF, 1994). The central concepts of social equity and the right to a healthy environment are entrenched in the Constitution, adopted in 1996 (RSA, 1996). The Constitution proclaims that *"… everyone has the right to have access to sufficient food and water"* [section 27(1)(b)], and requires the government to *"… take reasonable legislative and other measures, within its available resources, to achieve the progressive realisation of each of these rights"* [section 27(2)], thus making the government responsible for putting arrangements in place to secure access to sufficient water to meet the domestic needs of all South Africans (McDonald & Pape, 2002)*; (*RSA, 1996)*. Several laws and policies such as the National Water Act and the White Paper on National Water Policy support these concepts.

As Lindfors (2011) contends, the national Department of Water Affairs (DWA)[1] has the overall responsibility of water resource management and water service provision. As the leader of the water sector, its role is to support and strengthen the water service authorities (WSAs). This includes offering guidance toward effective management, monitoring performance and enabling capacity building. Moreover, the DWA has a central role in monitoring the sector's performance and ensuring the effectiveness of its duties. If the WSA is incapacitated to meet these standards, the DWA has the responsibility to intervene (DWAF, 2003)*. The DWA is also responsible for updating legislation and developing standards and national water policies while the South African Bureau of Standards (SABS) defines the standards that water quality must meet (DWAF, 1994)*. Additionally, the DWA manages information to be used for supporting, monitoring, regulating and planning (DWAF, 2003)*.

In 2005, the Drinking Water Quality (DWQ) Regulation programme was initiated by the DWA. It required microbial and chemical water quality testing to be done based on the South African National Standard 241 [short SANS 241 (SABS, 2006)]. This programme, which was restructured and renamed in 2008 as the so-called Blue Drop System, had the objective of ensuring that tap water quality improved through the improved performance of WSAs (Souza et al., 2009)*. The intention of introducing the Blue Drop Certification programme in 2008 was to increase awareness of water quality standards and to hold municipalities responsible for service delivery. While monitoring has substantially increased, the public's trust in water quality has not grown to the same level. By awarding WSAs with Blue Drop status if they are compliant with drinking water legislative and best practice requirements, it was hoped to increase transparency in DWQ management (DWA, 2010)*.

In 2011, the Blue Drop System increased its focus on engaging with the public by publishing water quality results. Municipalities were required to engage with the public, but it turned out that publishing these results was more complex than originally anticipated. Provinces such as the Eastern Cape,

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[1] Prior to 2010, the Department of Water Affairs (DWA) was called the Department of Water Affairs and Forestry (DWAF). The terms DWAF and DWA are used throughout this report based on the timeline of the publication referenced. Any reference prior to 2010 is referred to as DWAF; after 2010 it is referenced as DWA.

Northern Cape and Mpumalanga showed the lowest level of engagement with the public, while the provinces with high urban density performed the best.
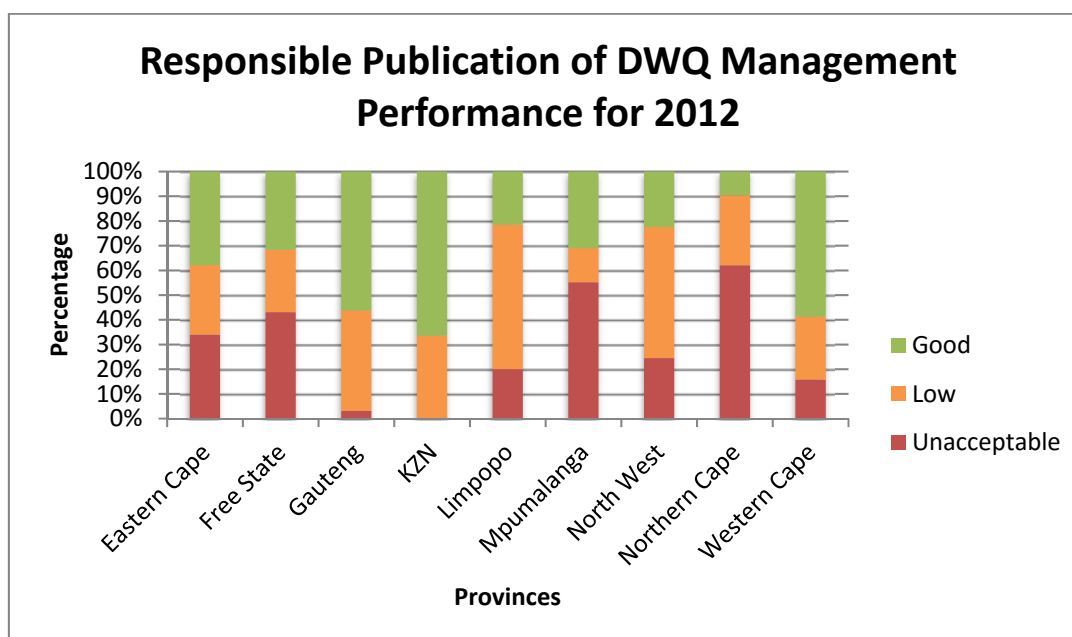
Figure 1: Publication of DWQ per province in 2012

2.2   Public Consultation and Service Delivery

In South Africa, public participation is not a privilege but a constitutional right. The constitutional provision places an obligation on government to establish public participation structures and systems. Tsatsire (2008) argues that public participation must be pursued – not only to comply with legislative prescriptions, but also to promote good corporate governance. In support of the 1996 Constitution, subsequent local government legislation and policy papers include 'local residents' under the definition of local government. Although public consultation and participation are part of the new developmental mandate assigned to local government, they remain a challenge that confront municipalities.

The transformation of local government in South Africa after 1994 has had several important implications. The first implication is that in terms of a variety of legislative prescriptions, the status of local government has changed. Municipalities have been assigned additional responsibilities, and structures have changed to suit these new functions. Planning must be integrated, and developmental and municipal performance must be measured and judged by the municipalities themselves, by residents and by the provincial and national governments. As part of their developmental role, municipalities are required to form partnerships with their communities.

Community participation does not happen in a vacuum. Communities are motivated to participate by the prospect of bringing development to their areas – development that is sustainable and empowering. This type of development is focused on basic and essential human needs such as water, food, health, safety and the like. It also focuses using indigenous knowledge to ensure that development is appropriate to local conditions and needs.

The primary aim of community engagement is to make municipalities more accountable and responsive by enhancing service delivery and improving governance (Buccus et al., 2007). However, there are some obstacles that need to be addressed. Municipal officials are often perceived by the community to be inaccessible owing to their associated high level of office (Green et al., 2005). This notion is maintained in a study conducted by Buccus et al. (2007) in which community members felt that community engagement made no difference to governance as they believed that it was used as a mechanism to legitimise decisions that had already been made at a higher level.

Relationships between traditional leaders and elected officials are another challenge to engagement processes and structures where uncertainties in political motivations exist (Buccus et al., 2007). Lack of communication among municipal departments and political intervention also hamper the progress of service delivery as projects are not properly funded or prioritised. This breakdown in communication often leads to inefficiency and uninformed decisions (Smith & Green, 2005). Projects have to be informed by the needs of communities, which are identified through ongoing community involvement and engagement. After implementation, monitoring and evaluation, communities should also be consulted to establish the impact of and their level of satisfaction with the programmes implemented.

2.3   The Role of ICT in Governance

The World Bank report of 2012 on ICT for Development highlighted the importance of an increase in the use of mobile phones. It was pointed out that the mobile phone has become indispensable, as it is "*arguably the most ubiquitous technology*" worldwide (World Bank, 2012). In comparison to the developed world, developing countries are seen to be in the best position to exploit the benefits of mobile communications. The mobile industry has its largest share in the developing world. Studies carried out by the International Telecommunications Union at the end of 2006 show that 67% of mobile subscribers live in developing countries (Bhavnani, et al., 2008). According to the World Bank report of 2012 – 3.4 billion of 5.9 billion mobile subscriptions were in low- to middle-income economies (World Bank, 2012).

"*Evidence from selected studies carried out by the United Nations Conference on Trade and Development (UNCTAD) shows that mobile phones have become the most important mode of telecommunication in developing countries. For the vast majority of the low-income populations mobile telephony is the sole tool connecting them to the information society … The benefits of mobile phones might be proportionally greater in resource-constrained settings, e.g., the poor and rural populations*" (Patil, 2011: 317).

2.3.1   Mobile communication and development

Mobile communications have created a variety of opportunities for human development "… *from providing basic access to education or health information to making cash payments to stimulating citizen involvement in democratic processes*" (World Bank, 2012). Mobile phones provide opportunities in which individuals and groups may begin to transform the situations in which they find themselves, such as improving human and economic conditions. Applications for mobile phones have been developed to help rural farmers gain access to pricing information through text messages, mothers receiving medical reports on the stages of their pregnancy by phone, and migrant workers sending remittances without using the usual banks. Mobile phones have been used in election monitoring, and they are seen as the key tool to topple unpopular regimes (World Bank, 2012).

The use of mobile technology in the development discourse is at times conceptualised as a tool that may be used to enhance productivity in place of labour as a way to alter or enhance information processing; and as way to alter or enhance social relations (Donner, 2005). Research on this conceptualisation of mobile phones has looked at the role of mobile communication in political mobilisation and resistance (Rheingold, 2002, cited in Donner, 2005). In a survey of studies that have focused on the use of mobile technology in developing countries, Donner (2008) highlights studies that focus on the impact in development as *"… the mobile is an incredibly powerful tool for exchanging ideas at a distance, and for managing daily life … examples of impact studies come from the ICTD [ICT for development] perspective, where researchers are interested in whether mobiles promote or enable economic growth or broader well-being. Mobile phones have been appropriated to be used in ways that are determined in the context of where the users find themselves in, for example, the practice of intentionally leaving missed calls*" (Donner, 2008).

According to infoDev's 2012 report on the use of mobile phones in South Africa, the main tool of communication for the low-income population is the mobile phone, which allows the conclusion that mobile technology will likely be the preferred medium in providing value-added services (infoDev, 2012). The infoDev (2012) surveys reveal that South Africa's mobile coverage is about 90% of the land mass and over 75% of the population own a mobile phone. Of those who own a mobile phone, 98.5% have a prepaid SIM[2] card, and the remaining 1.5% own contract lines. Mobile phones are mainly used for making and receiving phone calls, missed calls or placing please-call-me (PCM) messages, sending and receiving text messages (SMS[3]) and organising day-to-day lives.

The distinction between rural users and urban users is important to bear in mind when looking at mobile technology and development. Focus groups revealed that low-income urban users are aware of available applications, use social media and browse the Internet for jobs and educational grants. Rural users of similar income levels use micro-browsing because of its convenience but are sceptical about the importance of mobile applications. Mobile users without Internet access rely on traditional media for information and voice or text messages for communication. However, 71% of the low-income users have a mobile device that can access the Internet. There is a high use of social media with 50% of mobile users having signed up for a social network. However, interaction with government is limited with 69% of low-income users with Internet access not having used their phones to get information from a governmental organisation (infoDev, 2012).

2.3.2   Governance, service delivery and ICTs

Hellström (2008) defines governance as the relationships between the state, market and civil society, and the coordination and decision-making according to set norms and rules. Good governance, the form of governance that democratic states aim for, is seen as a "… *functioning democratic system where the freedom of expression and a sound juridical system are in place*" (Hellström, 2008). The term 'good governance' does not have a set definition but comprises participation, the rule of law, effectiveness and efficiency, transparency (built on the free flow of information), responsiveness, consensus orientation, equity, accountability, and strategic vision (UNDP, 1997 cited in Hellström, 2008).

Over the past decade, the notion of having access to mobile communication to influence governance is becoming more prevalent (Castells, 2012). The potential role of ICTs in governance has been identified as one that speaks to the participation from citizens in good governance. ICTs offer a space in which individuals can participate in discussion forums as well as contribute through social networking pages and blogs (World Bank, 2012). Several so-called 'm-government' (mobile government) systems have been developed and implemented in, for example, the Philippines. *"[A]bout half of Philippine government agencies offering e-services have incorporated SMS as a service delivery mechanism and in enhancing political participation"* with the main purposes being to *"provide information, to set-up feedback mechanisms for stakeholders either in form of complaints or suggestions, and to make service delivery faster and more convenient"* (Lallana, 2006, cited in Poblet, 2011).

In South Africa, a number of m-governance systems have been put in place. For example, in Cape Town, service faults can be reported by SMS and rates can be paid through a mobile phone billing system. An SMS system developed by the DWA provides information on the water quality at any location in the country (DWA, 2012). Another example is Lungisa – a community monitoring and reporting application (infoDev, 2012). The application allows people to report complaints about service delivery using their mobile phones. Through a monitoring platform, progress on the complaints made

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[2] Subscriber identification module

[3] Short message service

can be tracked (infoDev, 2012). The City of Johannesburg Municipality uses the social media platform Twitter for customers to get real-time updates about water saving and water service issues on @jhbwater (www.joburg.org.za). The municipality has described this as a way of improving service delivery and accessibility. Residents are encouraged to engage on the site with the Twitter account @jhbwater to alert the municipality of any issues. The Lwazi information system allows citizens to report service delivery issues in their preferred language of choice (CSIR, 2011). This service was created with the intention of targeting individuals located in remote rural areas but with access to mobile phones or landlines. The aim is to capture information that can be used to enhance service delivery.

Lack of communication and engagement between governments and citizens may be a key reason for protests and social movement resistance. Castells (2012) goes one step further and speaks about the "*networks of outrage and hope*" that represent the notion of communities not being heard and resisting the decision-making of governments. ICTs are seen as a potential avenue for opening up communication, making government accessible and empowering citizens to hold decision makers accountable. The mobile phone is experienced as a tool that individuals may use anonymously to participate in governance without fear of reprisal (Castells, 2012).

South Africa is familiar with the challenge of service delivery protests and the outrage of communities responding to failed implementations of infrastructure developments. ICTs have been identified as providing an opportunity to improve the communication between stakeholders and increase public participation in local decision-making. In 2012, the South African Local Government Association (SALGA) developed a municipal guide and roadmap to successful ICT governance for local municipalities to foster innovation and implementation of ICT projects. The SALGA is the combined representative of local municipalities that seeks, among other directives, to *"… transform local government to enable it to fulfil its developmental role … develop capacity within municipalities*" (www.salga.org.za).

The SALGA recognised the importance of aligning ICT and governance to improve the role of local municipalities, which is highlighted in its strategic plan of implementing ICTs in service delivery. The following aspects are highlighted in the SALGA ICT agenda (SALGA, 2012):

- Recognising that ICTs can be better leveraged to improve effective administration, service delivery and socio-economic development and that ICTs should therefore be integral to the functioning of any well-run municipality.
- Raising the political and actual profile of ICT within local authorities and communities.

ICT use is seen as having the potential for rapid and sustainable economic and social development when used appropriately within municipalities. The SALGA speaks directly to the vision of the Local Government Turnaround Strategy, which asserts that municipalities should have appropriate infrastructure and connectivity and that all municipalities should have ICT systems to speed up service delivery and improve efficiency and accountability (SALGA, 2012). The successful implementation of ICT within municipalities requires orientation, education and training of staff, which is a costly process but necessary for the successful use of ICT systems.

2.4   Incentivising Community Engagement

This study assesses the notion of incentivising rural communities to report drinking water supply issues using ICTs. In order to understand how public engagement can be fostered and increased, new avenues to engage with citizens need to be investigated and the possibility of incentivising change has to be analysed. As shown in the previous sections, public participation and community engagement are crucial to good governance and are also a legal requirement in South Africa.

Active community engagement relies on communities wanting to engage and to contribute to the management and governance of services and on governance structures, proactively seeking such

engagement. However, research has also shown that communities in rural areas are less inclined to engage in the formal structures of governance than their urban counterparts. Similarly, rural communities are less responsive and influenced by reports in the media (Gool, 2011). Some research even shows that despite negative reporting on water quality in rural areas, communities still felt that their water was safe (Gool, 2011). Mamdani (1996) suggests that this could be based on the notion that rural communities perceive themselves as subjects rather than citizens and might therefore experience services as a privilege rather than a right. People are often annoyed/angered by the inequalities between the services they receive and the level of service they desire (Zhuwakinyu, 2012). A study done by Smith and Green (2005) found that while households were dissatisfied with the service they received, they were apprehensive about demanding better services from municipalities since most felt that they had no rights to exercise such complaints based on the low levels of participation and non-payment of bills (Smith & Green, 2005).

In order to re-establish good governance, communities must be given the opportunity to engage and current barriers have to be overcome. One way to overcome such barriers of disengagement is to incentivise engagement. As the literature reveals, this is a rather complex process and over the past decade much has been learnt of the challenges of incentivising public engagement. Hohmann et al. (2012) show that individuals are more committed to co-operate if communication between stakeholders increases and if social feedback reinforces the co-operative nature of an individual. This is particularly relevant when using social networks to increase communication. Sheth et al. (2010) indicate that potential behaviour change strategies include mass media promotion, clinic-based education, government engagement through popular government representatives and interpersonal communication. While monetary rewards are often used as an incentive, Feldman et al. (2009) found that the offering of money to whistle-blowers led to less, rather than more, reporting of illegality.

In 1997, Lado presented their findings in a study, namely, that financial incentives to save money in the water sector and to manage scarce water resources were far less effective in rural and poor environments and proved difficult to implement (Lado, 1997).

Franceys and Gerlach (2011) presented findings that indicate that poor communities are generally very interested and willing to be involved in improving access to water supply and that education and the understanding of water supply system can serve as an incentive. Another incentive to report service faults in the water sector was the experience of putting the report in the public domain, which would serve as a punitive incentive to the municipality to resolve the matter.

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Abbot and Guijt (1998) show that there have to be clear incentives for a community to be interested in monitoring over a longer period. Their study shows that participatory monitoring is difficult and costly – not only for an organisation but also for the community. Abbot and Guijt (1998) refer to a study done by Irons and Walker in Australia in 1998, which highlighted economic factors that limit the potential of community-based monitoring:

- *"Community groups rarely have access to sufficient resources to enable long-term monitoring;*
- *There is no reason to believe that it is sufficient to motivate consistent, longer-term monitoring service in the community without proper remuneration".*

3 RESEARCH METHODOLOGY

3.1 Introduction

This chapter describes and justifies the research methodology used for the project. First, the general study approach is discussed. This is followed by an overview of the process followed in selecting case sites, as well as a description of each site selected for inclusion. Lastly, the methodology used for the design, development and implementation of the ICT is described.

3.2 Study Approach

In order to effectively assess the possibilities of engaging communities in managing drinking water supplies, an initial investigation into many different fundamental aspects of the delivery of drinking water was required. Most municipalities and government structures assume and rely on the idea that difficulties or failure within the water supply chain – be they smell, taste or interruptions to service – are reported by the public through available channels, such as telephone, the media or via other stakeholders. The literature review showed that despite clear evidence that rural water supplies fail more often than urban systems, reporting from rural communities is unusually low. The assumption is that there are barriers that hinder reporting in rural communities, which include communication costs involved in contacting the municipality, communities lacking knowledge of whom to contact, and a general lack of motivation to engage with government.

This study investigated whether the above-mentioned barriers can be mitigated through a system that provides the finances, the knowledge and the incentives to report water supply failure. To develop such a system and to assess the barriers, the following steps were followed in this project:

1. Selecting study sites and assessing preparedness for participating.
2. Investigating how communities can be incentivised to contribute to water supply monitoring.
3. Designing, developing and implementing an ICT system that can be used for reporting water supply faults.
4. Assessing the ICT system and how it can play a role in improving the current reporting by providing the knowledge and overcoming the cost of contacting the appropriate municipal offices.

The research adopted an intensive case study approach, which assessed how a process is established in a particular setting and what participants or the intervention did to produce change. The study was exploratory in nature; respondents were given the opportunity to engage freely, reflect on their learning, assess changes – and, equally, the researchers built up their knowledge throughout the study (Mingers, 2004; Sayer, 2010).

The methodology of the study took the existing and possibly different structures in each of the study sites into account. The difference between the sites could obscure the findings and it was therefore important to assess the impact of contingent relationships. Attention was paid to social and political relationships within the study sites. This was particularly important in the context of engaging two often opposing groups of municipalities and communities, with the communities receiving services and municipalities providing the service. Since a number of sites contributed to the artefact design, it was expected that the levels of diversity would be representative of the diversities found in communities and municipalities in South Africa.

3.3 Study Site Selection and Description

Since the focus of the study was on water service delivery in rural areas, the notion of rurality had to be defined prior to selecting the study sites. The term 'rural environment' is highly contested, particularly in South Africa, where the delineation of the country into different areas has resulted in an unequal distribution of resources. Even though the criteria for delineating settlements vary from country to

country, the contrast between urban and rural areas is generally related to stereotypical differences associated with their populations.

In South Africa, the classification of settlement type is generically based on the dominant dwelling type and land use as well as a lack of resources available, which include access to water, sanitation, housing and education. To define rurality beyond population density, an extended set of criteria was developed using a number of parameters highlighted in recent studies (Everatt, 2009).

The criteria in Table 1 will be used as a proxy for rurality for all study sites:

Table 1: Criteria for assessing rurality of study sites

Indicator	Definition
Population density	Number of households per square km
Female-headed households	Proportion of households headed by women
Education level	Proportion of population (20+) who have completed matric
Rate of unemployment	Proportion of the economically active population who are unemployed
Social grant dependency	Proportion of households dependent on social grants
Dwelling type	Proportion of households classified as traditional
Water	Proportion of households without access to a basic drinking water supply
Sanitation	Proportion of households without access to basic sanitation

Community-based research faces many ethical dilemmas, which range from the power-intent relationship of the research team entering the community to the perceived benefits of being seen to work with universities and the hope that something will change once the research team leaves. This study relied heavily on the engagement between researchers, municipalities and communities. It was therefore paramount to establish the intentions from the researchers' side and the expectation of the community and municipality early on.

During the duration of the study, the community and the municipality perceived the researchers as a resource. This required ongoing management to avoid creating expectations that may not continue after finalising the study. The research team was aware of these challenges and the potential of these types of research project where information is extracted for self-advancement without giving anything in return. To minimise these challenges, a detailed process of engagement was entered prior to the study and each municipality was assessed regarding its preparedness for participating. The process of engagement prior to starting the study can be found in 0.

3.3.1   Description of study sites

South Africa comprise nine provinces with an estimated population of 53 million (Stats SA, 2013). The rural areas as per the criteria in Table 1 can be identified within each of the provinces.

Several constraints were considered prior to site selection. Owing to budget requirements, it was important that the sites did not require extensive travel. Additionally, it was felt that areas previously used as field sites should be avoided since a certain research fatigue has set in. This is particularly true for the former homelands of the Eastern Cape, which were therefore excluded from the study. Based on these constraints, it was decided that the rural areas of the Eastern Cape coastline would be appropriate.

Figure 2: South Africa and its nine provinces⁴

Geographically, the Eastern Cape is the second-largest province covering an area of 168 966 km^2 (Stats SA, 2012) and is home to 6.62 million people (Stats SA, 2013). The Eastern Cape consists of two metropolitan municipalities (Nelson Mandela Bay and Buffalo City), six district municipalities (Alfred Nzo, Joe Gqabi, OR Tambo, Chris Hani, Amathole and Cacadu) and 37 local municipalities (Anon, 2011).
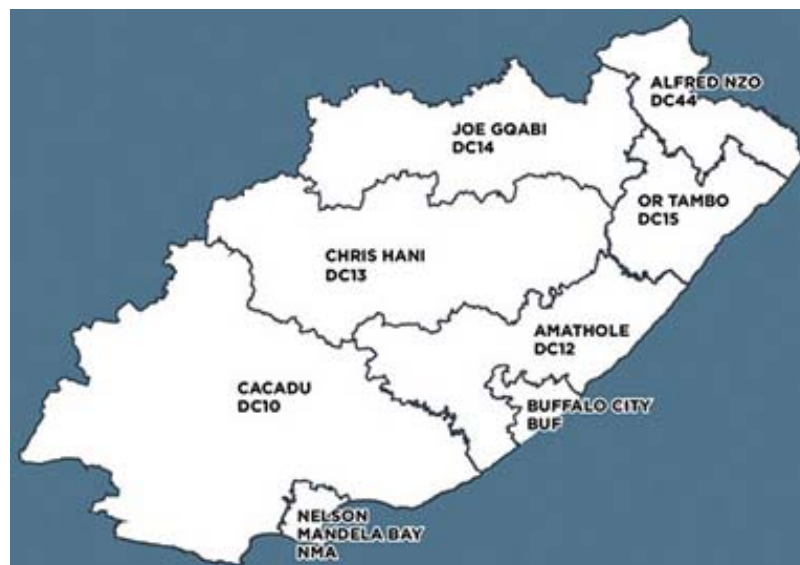

Figure 3: Municipalities of the Eastern Cape

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⁴ Source: Wikipedia Online Encyclopedia, 2011. Retrieved from http://en.wikipedia.org/wiki/File:Map_of_South_Africa_with_English_labels.svg [Accessed: 24 February 2014].

The rurality criteria per site are presented in Table 2.

Table 2: Rurality criteria per study site

Indicator and Definition		Kou-Kamma Municipality	Ndlambe Municipality
Population density	Number of households per square km	3.1	10.5
Female-headed households	Proportion of households headed by women	31.2%	42%
Education level	Percentage of population who have completed matric	17.6%	20.1%
Rate of unemployment	Proportion of the economically active population who are unemployed	15%	30.3%
Social grant dependency	Proportion of population between ages of 15 and 64 dependent on social grants	52.1%	54.3%
Dwelling type	Proportion of households classified as traditional	0.3%	3.8%
Water	Proportion of households without access to basic drinking water supply	35%	17%
Sanitation	Proportion of households without access to basic sanitation	20%	32%

The study sites selected were Kou-Kamma Local Municipality and Ndlambe Local Municipality, which are located in the Cacadu District (Figure 4). These sites were selected by applying the rurality criteria and following the process described in Appendix A to assess preparedness to participate.

The overall Blue Drop score for the Eastern Cape in 2012 was 82.1% with Cacadu District municipality achieving an average Blue Drop score of 40% (DWA, 2012a).
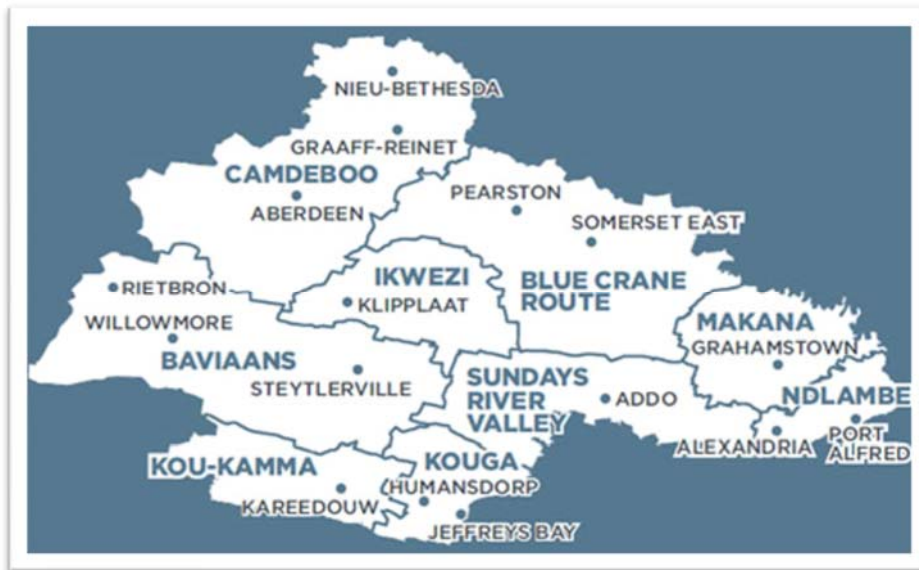
Figure 4: Map of Cacadu District[5]

3.3.2   Ndlambe Local Municipality

Ndlambe Local Municipality is bordered by the Makana Local Municipality in the north, Sundays River Valley in the west and Ngqushwa (Amathole District Municipality) in the east. It encompasses the towns Alexandria, Port Alfred, Bathurst, Boknesstrand, Cannon Rocks and Kenton-on-Sea. The Ndlambe Local Municipality serves a population of approximately 61 000 people, comprising 78% black people, 14% white people, 7% coloured people and less than 1% of people are of Indian or Asian descent. The dominant language spoken is Xhosa (77.7%), followed by English (12.2%) and Afrikaans (11.7%) (Stats SA, 2011a). The unemployment rate for the area is 30% with a large portion (about 42%) of female-headed households. Literacy rates are estimated to be 54%, which is below the provincial average of 60.2% (Ndlambe Local Municipality, 2013). Only 20.1% of the population residing within Ndlambe has completed matric and only 9.9% have some form of higher education (Stats SA, 2011a).

The Ndlambe Local Municipality is a WSA and water service provider (WSP) with the Amatola Water Board. In 2012, the municipality achieved an overall Blue Drop score of 42.37% and ranked 11th (out of 17 municipalities audited), which is an improvement on its 2011 score of 20.93% (DWA, 2012a). However, the 2012 Blue Drop score is *"… not a true reflection of the Ndlambe Local Municipality's drinking water quality management"* because "… *inspectors had great difficulty obtaining information from those responsible for the various functions*" (DWA, 2012a: 57).

A total of 83.2% of residents has access to municipal water (shown in Figure 5), but only 36.1% of the population has access to piped water inside a dwelling (Stats SA, 2011a). "*The Ndlambe Municipality defines low level access to water services as that of RDP[6] standards, being a tap supply within a 200 m radius of all urban consumers, while high level access is considered when water supply is available within households*" (Ndlambe Local Municipality, 2008: 28).

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[5] Source: The Local Government Handbook Website. 2012. Retrieved from http://www.localgovernment.co.za/ districts/view/3/cacadu-district-municipality# [Accessed: 24 February 2014].

[6] Reconstruction and Development Programme

Sources of water

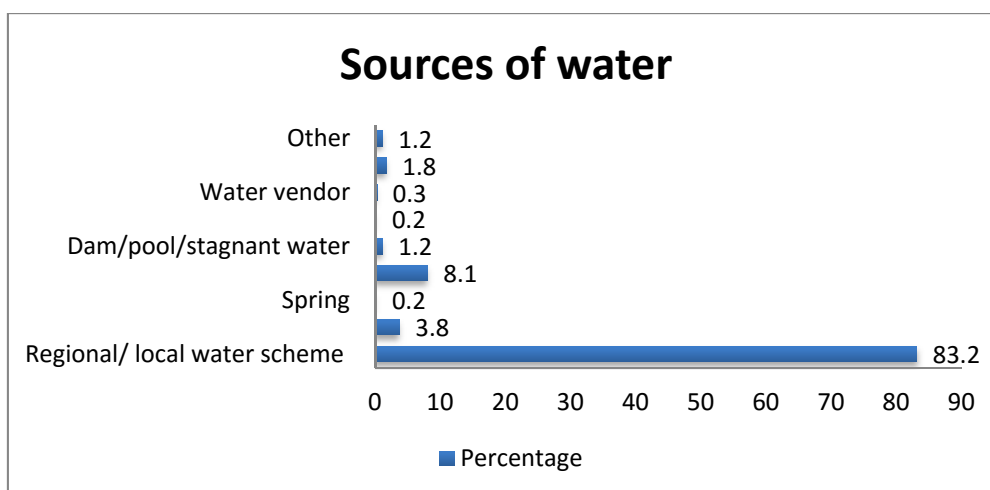| Category	Percentage
Other	1.2
	1.8
Water vendor	0.3
	0.2
Dam/pool/stagnant water	1.2
	8.1
Spring	0.2
	3.8
Regional/ local water scheme	83.2

Percentage

Figure 5: Water sources (Stats SA, 2011a)

The Ndlambe Municipality maintains and operates all sewerage systems within both its functions as WSA and WSP (Ndlambe Local Municipality, 2008). As shown in Figure 6, only 35.6% of households have access to a flush toilet connected to a sewerage system; 25.1% of households have access to a flush toilet connected to a septic tank; and 20.6% of households have access to a pit toilet without ventilation (Stats SA, 2001a).

According the Blue Drop Report of 2012, the municipality was not an easy audit case (DWA, 2012a). Obtaining information proved difficult for the auditors and none of the water treatment works were classified in terms of the legislative requirements. However, this municipality was said to perform satisfactorily in terms of the quality of tap water when compared to similarly sized municipalities. However, substantial improvements were required (DWA, 2012a). Because no results have been made available to the public beyond 2012, it is difficult to know whether the municipality is currently following constitutional laws in terms of water and sanitation.

Sanitation facilities

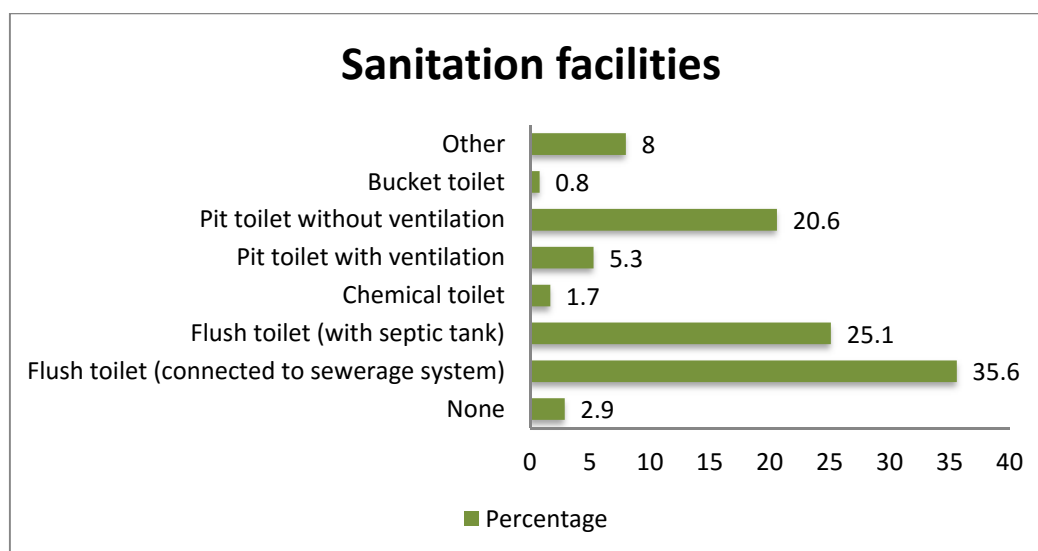| Category	Percentage
Other	8
Bucket toilet	0.8
Pit toilet without ventilation	20.6
Pit toilet with ventilation	5.3
Chemical toilet	1.7
Flush toilet (with septic tank)	25.1
Flush toilet (connected to sewerage system)	35.6
None	2.9

Percentage

Figure 6: Sanitation facilities (Stats SA, 2011a)

Figure 7 shows that most people (about 12%) residing in Ndlambe access the Internet using mobile phones; 11% have access to the Internet at home; 3% from work; 4% from 'elsewhere' with 70% without any access (Stats SA, 2011a).
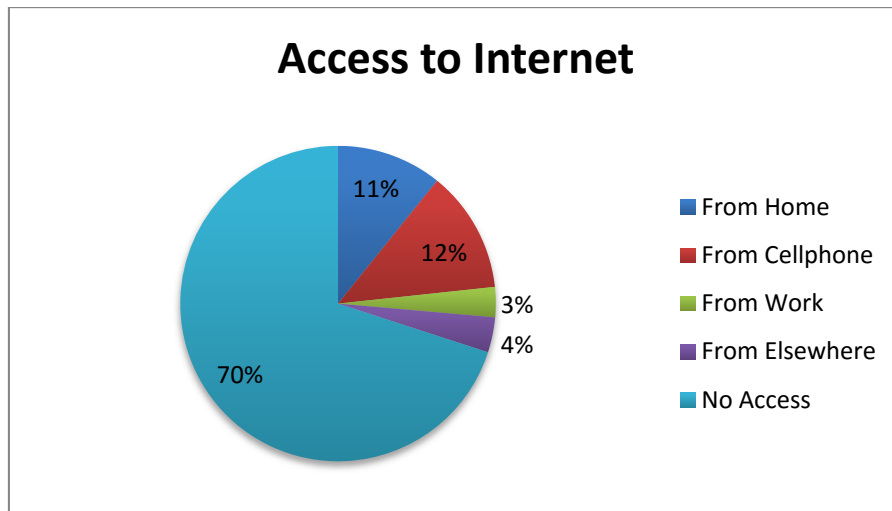
Figure 7: Access to Internet (Stats SA, 2011a)

3.3.3   Kou-Kamma Local Municipality

Three other local municipalities border Kou-Kamma Local Municipality, namely, Kouga to the east, Baviaans to the north, and Bitou (Western Cape) to the west. Kou-Kamma Municipality comprise the Langkloof area, which consists of the towns of Kareedouw, Joubertina and Louterwater, and the coastal belt, which comprise the Tsitsikamma area and includes Storms River, Coldstream and Clarkson (Kou-Kamma Municipality, 2011; Kou-Kamma Local Municipality, 2012).

Kou-Kamma covers an area of 12 570 km^2 (Kou-Kamma Local Municipality, 2006) and houses a population of approximately 41 000 people, which comprise 60% coloured people, 31% black people, 9% white people, and less than 1% people of Indian or Asian descent. About 1.1% of the population is classified as 'Other', which may partially be explained by the high level of migration labour from other countries (Stats SA, 2011b).

Afrikaans is the most commonly spoken language in the area with 74% of the population as Afrikaans primary language speakers, followed by Xhosa with 20% of the population as primary language speakers and only 2.5% of the population as English speakers (Stats SA, 2011b).

The unemployment rate for Kou-Kamma is 15%, which is the lowest in the province (Kou-Kamma Local Municipality, 2012). Only 17.6% of the population residing in Kou-Kamma has completed matric and only 3.9% has some form of higher education (Stats SA, 2011b). The education levels are considerably lower than those of Ndlambe and Kouga.

Kou-Kamma Local Municipality is both the WSA and WSP for its designated area. According to the Blue Drop Report, the municipality ranked 16th out of the 17 audited municipalities. It is regarded as the worst-performing municipality. Kou-Kamma's Blue Drop score for 2012 was 5.6%, which is a regressive score from 2011 when it scored 14.36%. Most of the water systems failed to score on the DWQ compliance, management of the water system and treatment processes (DWA, 2012a).

A total of 68.2% of Kou-Kamma households have access to water from within a dwelling and 64.7% of households receive their water from a municipal water scheme (refer to Figure 8). The second-largest source of water for 14.6% of households is boreholes; the third-largest source of water for 10.7% of households comes from dams/pools/stagnant water (Stats SA, 2011b).
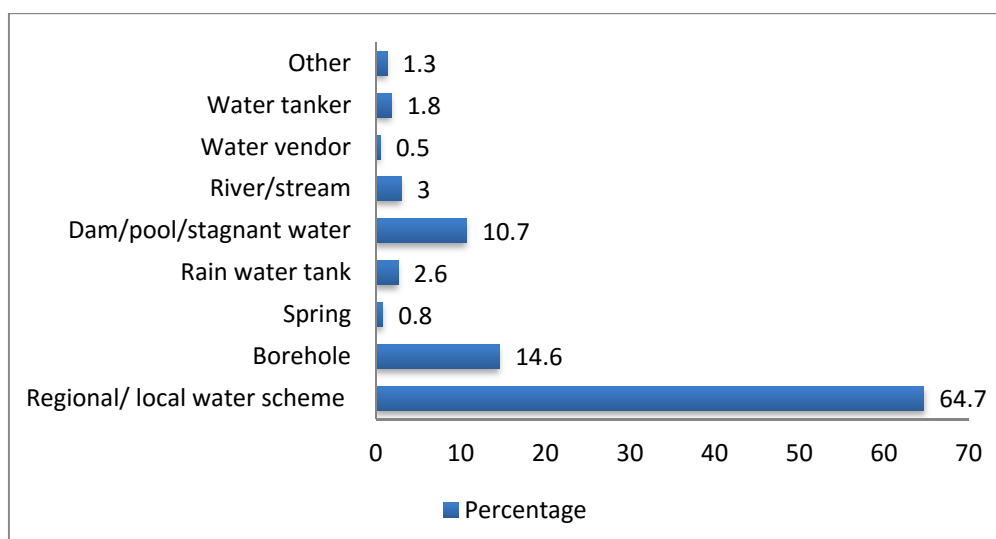
Figure 8: Water sources (Stats SA, 2011b)

Most households (68%) have access to a flush toilet connected to a sewerage system as shown in Figure 9 (Stats SA, 2011b). One of the major service delivery challenges that Kou-Kamma experiences is the vast geographical distances between settlements, which places a high demand on the limited resources needed for operation and maintenance (Kou-Kamma Local Municipality, 2012). "*Communities complain that they wait up to two weeks to have sewerage problems attended to and this poses health-related risks. Solutions should be found to deal with this problem. Part of the solution needs to consider community awareness regarding their own practices that result in blocked pipes*" (Kou-Kamma Local Municipality, 2012: 77).
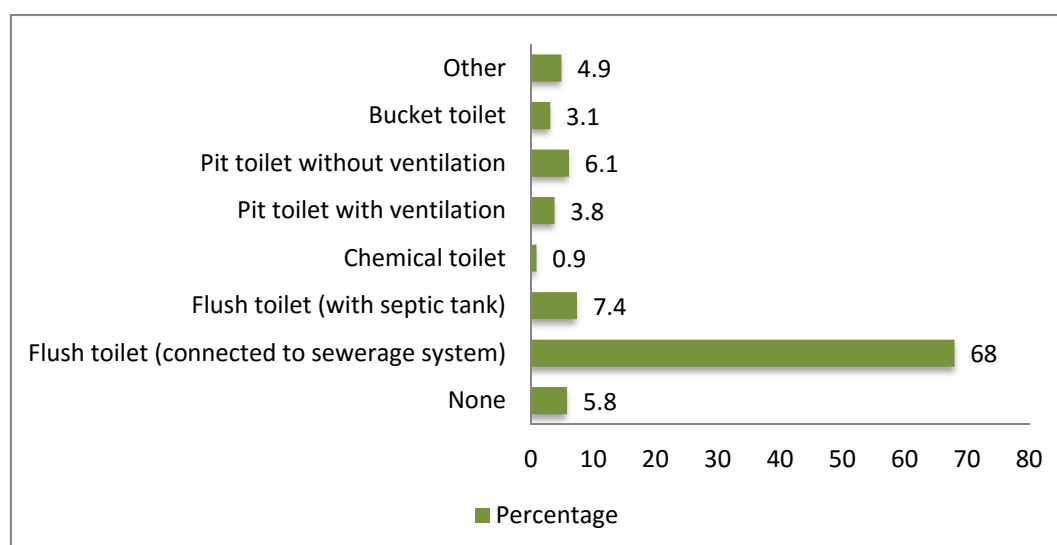
Figure 9: Sanitation facilities (Stats SA, 2011b)

According to the Blue Drop Report of 2012 (DWA, 2012a), Kou-Kamma Municipality has been facing several challenges regarding water quality management. The municipality's performance was marked as dismal during the audit. The report highlighted that there was little commitment to safeguarding citizens against the risks of poor water quality. The DWA had issued warnings to all residents and visitors of the Kou-Kamma area not to consume tap water without taking measures to improve its quality (DWA, 2012a). The 2012 Blue Drop results for the period of the report indicated that the municipality did not follow constitutional laws regarding water and sanitation. Unfortunately, no further data regarding water quality has been made public since 2012.

The analysis of the prevalence of ICTs in Kou-Kamma Municipality showed that most households (77%) do not have access to the Internet (Figure 10). Only a few households have access with 9% using mobile phones, 5% accessing from home, 3% accessing from work and 6% accessing from elsewhere (Stats SA, 2011b).

Figure 10: Access to Internet (Stats SA, 2011b)

3.4   Design, Development, Implementation and Evaluation of an ICT System

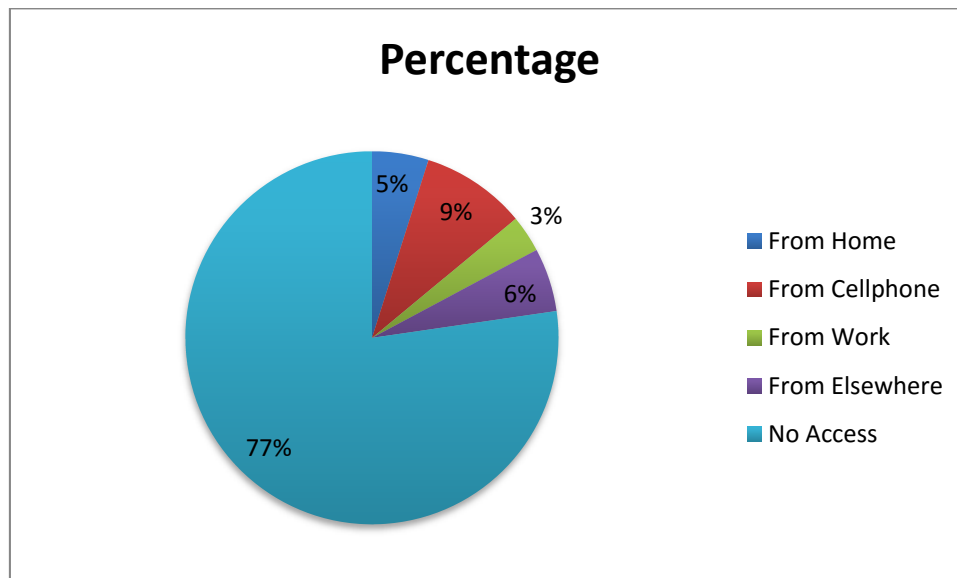Different methodologies were used to design, develop, implement and evaluate the ICT system. This is to accommodate the difference between each of these steps. Designing and conceptualising a system requires different methods to implement and assess the impact and success of the system. Each of the methods is introduced in the sections below.

The ICT system was named Amanzi.

3.4.1   Design and development of the ICT system Amanzi

A co-design approach was used for the design of Amanzi. This approach relies on community and municipalities becoming co-designers together with the researchers and developers. The needs of each stakeholder were represented during the design process. Paternalistic notions of development were avoided by engaging the community and municipalities directly (Rivett et al., 2014b).

The engagement for the design process commenced with semi-structured interviews held with the municipalities between 30 March 2014 and 04 April 2014. Through these meetings, details regarding the municipal structure, current practices, workflow processes, community engagement practices and the overall enablers and barriers to implementing an ICT system were identified. To gain insight into the views held by citizens and to determine whether these views matched those of the municipality, meetings were also held with communities from both municipalities in May 2014. The communities of Bathurst, Port Alfred and Alexandria were interviewed in the Ndlambe Municipality. The communities of Storms River, Joubertina and Kareedouw were interviewed in the Kou-Kamma Municipality. For both sets of interviews (municipal and communal), five topics were covered: municipal structure, water and sanitation services, service delivery, customer relations, and existing information systems (Appendix B and Appendix C).

A WRC seminar was held in Port Elizabeth on 17 July 2014 to present the project and findings to a group of stakeholders from the municipalities and the research community. Presentations were given on what had been learnt on the project to date, the feedback from municipal and community surveys,

and the first designs for the ICT system. Stakeholders provided further feedback, which was integrated into the final design of the system. It is described in Chapter 5.

3.4.2   Implementation of the ICT system Amanzi

The system was introduced to the municipalities and their respective communities between 27 October 2014 and 30 October 2014. Communities were informed of the new system and the revised process of engaging with the municipalities through meetings and pamphlets. Pamphlets (0) were distributed at central locations such as libraries, shops and post offices within each community, and given to community members who attended the meetings.

Municipalities and their satellite offices were given a test login early October 2014 to test the system prior to any training. This was to understand the level of self-evidence of the system. Training workshops for municipal staff were then held on 27 October 2014 and 30 October 2014. One of the requirements for the training was that the technical team be present to ensure that the complaint data and job allocation would be aligned. The analysis of the implementation process can be found in Chapter 4.2.

3.4.3   Evaluation of the ICT system Amanzi

Analysis of the implemented ICT system was based on constructs adapted from the Technology Acceptance Model (TAM) proposed by Davis (1989). TAM provides a framework for analysing and accepting different types of information system and individual technology acceptance behaviour (Surendran, 2012).

For this study, three constructs of TAM were applied: Perceived Usefulness (PU), Perceived Ease of Use (PEOU) and Actual Systems Use (ASU). Davis (1989) defines PU as the prospective user's subjective probability that using a specific application system will enhance his/her job or life performance. PEOU can be defined as the degree to which the prospective user expects the target system to be free of effort. According to the TAM, PEOU and PU are the most important determinants of ASU (Shroff et al., 2011). PU and PEOU have an influence on ASU. This is based on the following assumptions:

- If municipality staff perceive the system as useful and easy to use, they might have a positive attitude toward using it.
- If municipality staff has a positive attitude toward the system, they might use the system purposefully and have better intentions toward it.

The ASU was measured through data logs from the server. To assess PU, PEOU and ASU, municipal users were interviewed before, during and after the system implementation timeframe of six months. The questionnaires can be found in Appendix E and Appendix F. The ICT system was monitored regularly from 01 November 2014 to 10 June 2015. Monitoring the system usage involved keeping track of the number of complaints recorded, the number of complaints resolved, and the number of complaints waiting for feedback.

A research team member logged into the system, checked for any newly recorded complaints and recorded their reference numbers, contact numbers and operational level in an Excel spreadsheet. If a mobile phone number was available, complainants received a feedback SMS (Figure 11).
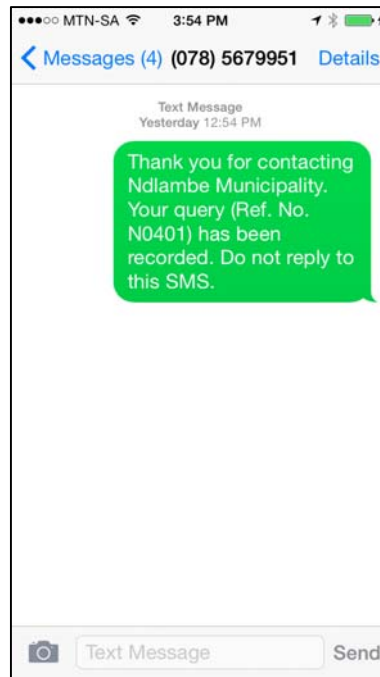
Figure 11: Example of feedback SMS

4 ICT SYSTEM IMPLEMENTATION AND EVALUATION IN TWO RURAL MUNICIPALITIES

As described in the previous chapter, the design, development and evaluation of Amanzi was divided into three parts, which are presented here. The analysis provides an insight into the current structures of engagement and the key challenges municipalities face in managing water and sanitation delivery issues. Community members and the municipality staff were also interviewed on the existing ICT infrastructure and the use of ICTs in the community, and the findings from these interviews are presented below. A CD containing Amanzi is attached to this document. Instructions for its installation can be found on the CD.

4.1 Amanzi Design

ICT systems are implemented in a context. Literature shows that the sustainability and success of a system implementation depends strongly on the design of the system responding to such a context and being relevant in the local setting. To develop a context-relevant system, the study had to understand these existing practices to enhance the enablers to communication and minimise the barriers. Additionally, a detailed analysis of the existing workflow processes for water and sanitation service delivery was done for each municipality in order for the system to integrate into these processes.

4.1.1 ICT context analysis

In April 2014, semi-structured interviews were held with the municipalities to establish details on the municipal structure, the internal workflow, community engagement practices and the overall challenges and progress. Common challenges within municipalities were the following:

- Lack of IT skills.
- Unsatisfactory customer service approach.
- Unclear roles and responsibilities of staff.
- The process of complaint being cumbersome and sometimes costly to the resident.
- Information in the municipality not being streamlined and coming from multiple sources.
- Lack of tracking mechanisms for progress on complaints.
- Municipal capacity.

Municipality B highlighted the concern of high staff turnover as well as the number of staff who had multiple portfolios. Municipality B had an established complaints process, and a functional website that was updated and used regularly. Additionally, there was an established internal IT infrastructure. The most common methods of laying complaints used by the public were walk-ins, calling in and, in certain instances, email. However, phone calls and emails incurred a financial cost to citizens. Complaints were written on a piece of paper before being entered into a logbook (or Excel spreadsheet). They were then handed over to the responsible person either via phone or in person, but no tracking mechanisms were used. Complaints were attended to on a first-come-first-served basis (depending on the complexity of the problem and availability of resources). No turnaround time for resolving issues was set. On weekends and public holidays, calls were diverted to the municipality's Fire Department, who had a standby technical team available to respond to issues that occurred during these time periods.

Municipality A highlighted a lack of a formal complaints register and the costs residents incurred to lodge a service delivery problem. There was no toll-free line as has been established in most urban environments. The municipality did, however, have a 24-hour telephone line to lodge problems. The community reported service problems in an ad hoc manner without following established processes. Citizens would contact the municipality's offices, municipal workers, the mayor, satellite offices and ward councillors. Walk-ins were the most common method of laying complaints, although no tracking mechanisms for complaints were used. Complaints were prioritised by assessing the impact to the community as a whole. Job cards for each complaint were created and given to the responsible persons. The water resource manager was tasked to resolve water and sanitation complaints.

The ICT analysis showed that all community members either had access to a mobile phone or owned a mobile phone. Additionally, all communities had access to a computer through libraries. Some households had personal computers. Most phones available in the communities were used for SMS and MMS[7]. Some people used Twitter, WhatsApp and Facebook on a regular basis. The airtime usage varied greatly from community to community.

The field visits and interviews identified the following common barriers both municipalities and their respective communities faced:

- Both municipalities suffered from a lack of funding and resources as well as aging infrastructure.
- Vast distances existed between the main and satellite offices of each municipality.
- Some citizens did not know to whom to report and ended up reporting to the wrong departments and/or municipal staff members.
- Some citizens were deterred by the financial costs associated with reporting a complaint.
- Citizens expressed a lack of feedback from municipalities.
- Citizens felt that preferential treatment existed in the management of complaints.

Enablers identified to implementing an ICT system were the following:

- Both municipalities have existing IT infrastructures in place.
- Technical teams, dedicated to resolving issues of water and sanitation, are available.
- Both municipalities displayed a strong willingness to be a part of the research project and there was a definite interest in taking ownership of the system.

Using the ICT system design considerations and stakeholder inputs, a conceptual design of the system was developed. Although off-the-shelf systems could have been used, e.g. automated call centre applications or fully fledged off-the-shelf mobile applications, they were deemed unsuitable due to the following two main reasons:

- They either required substantial customisation and a high level of technical skill; or
- They were too expensive.

It was felt that the requirement of a high level of technical skill would result in the system not being sustainable. It was therefore felt that a low-cost and low-maintenance system design would be the most appropriate.

4.1.2 ICT system layout

The conceptualised ICT system structure can be described as follows (see Figure 12 for the diagrammatic system design):

1. Citizens were able to use either a PCM system, a toll-free call or alternatively walk to the office to register their complaint. This ensured that there was no cost to the citizen when lodging a complaint or registering a concern regarding service delivery.
2. The local office (which could also be a satellite office) would receive the problem and register the problem and the complainant's contact details. This information was then recorded on the database.
3. The technical team would log into the database daily to review new problems. The team would then schedule a date for the problem to be addressed, and the system created a unique reference number to be sent by SMS to the citizen.
4. The technical team would see to the problem and update the record on the database.
5. If the problem was still outstanding within three working days, the local office would review the problem, investigate the delays and communicate with the client.

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[7] Multimedia messaging service

6. Local councillors or community development workers were given a login to the database to review records.
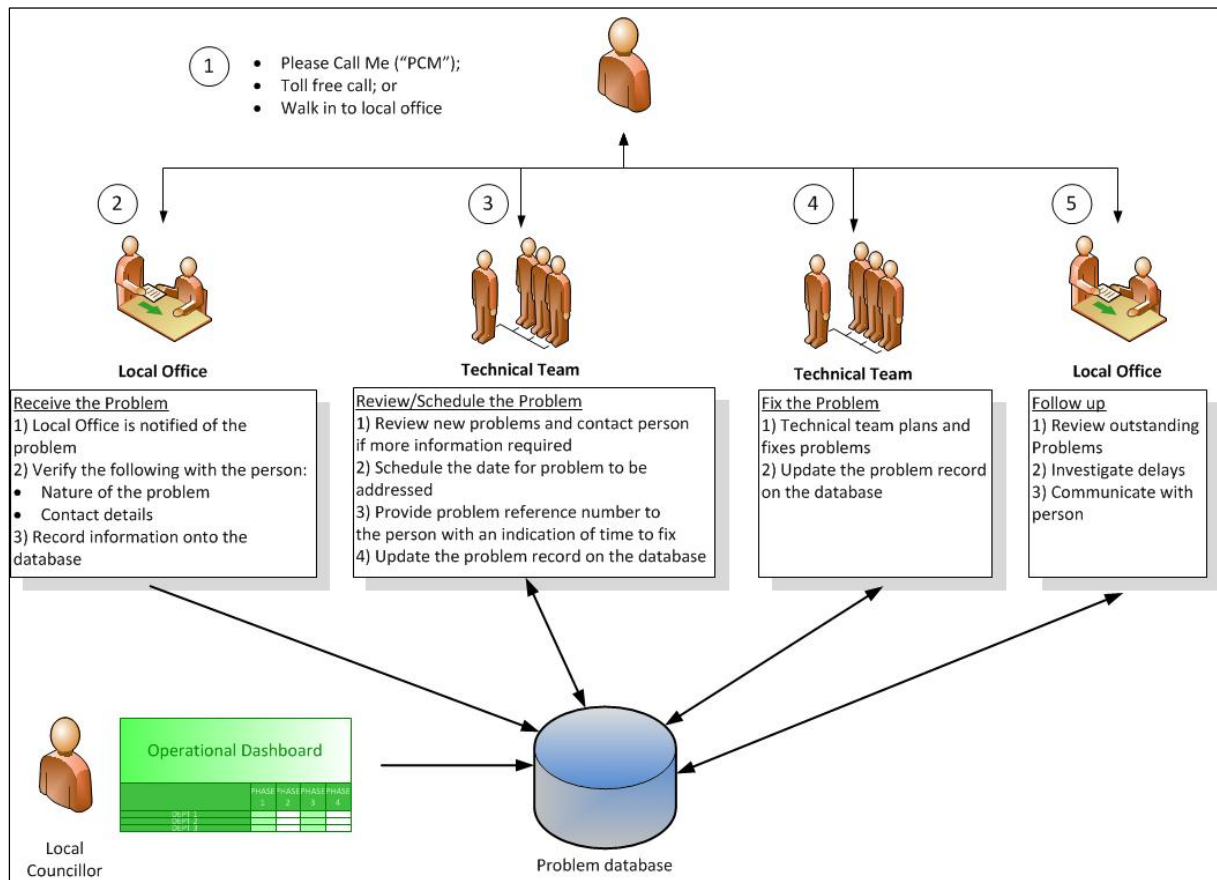
Figure 12: ICT system layout

The architecture of Amanzi was developed to secure appropriate data storage and retrieval. The main function was the data entry module, which ensured that water complaints reported from the community were logged. Figure 13 shows the system architecture with its components.

Figure 13: Components of Amanzi

4.1.3 ICT system Amanzi development

Amanzi was developed using the Microsoft.NET Framework (Microsoft Visual Studio 2012) and DevExpress (Developer Express) for the front end of the application. The database was developed using the MySQL Database Management System (client version 5.1.11). MySQL Visual Studio

23

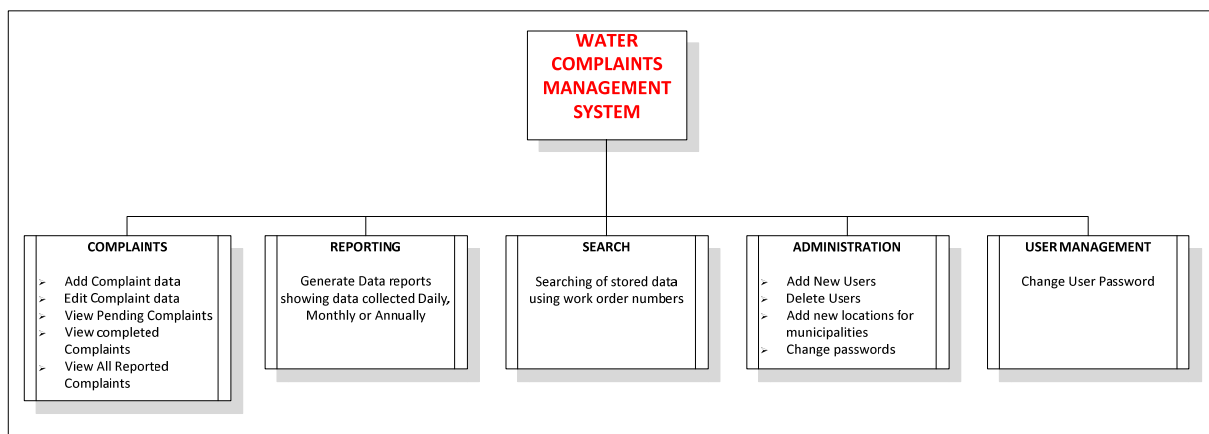Connector/NET (version 6.6.5) was used to interconnect between MySQL and Visual Studio 2012 while Crystal Reports Software (version 13.0.5) was embedded within Visual Studio to generate and export reports to PDF, Microsoft Word and Microsoft Excel format. A CD containing Amanzi is attached to this document. Instructions for its installation can be found on the CD.

User interfaces for Amanzi were designed to be simplistic and easy to use (Appendix G). A central database with user logins were created for each municipality, which was hosted centrally on servers located at UCT with the URL: amanzi.uct.ac.za. The servers were supported 24 hours around the clock, which ensured that there was no database failure for the duration of the research project. Regular database backups ensured that recovery of system data was possible even when the system failed. The system had authentication and authorisation mechanisms before any user could access it. The online system security was managed through a firewall security system on the server.

The system design was simple, easy to use, low cost and web-based. Scalability was ensured through it being a web-based system and by supporting several hardware, i.e. computers, tablets and smartphones. Figure 14 shows the accessibility of the software.
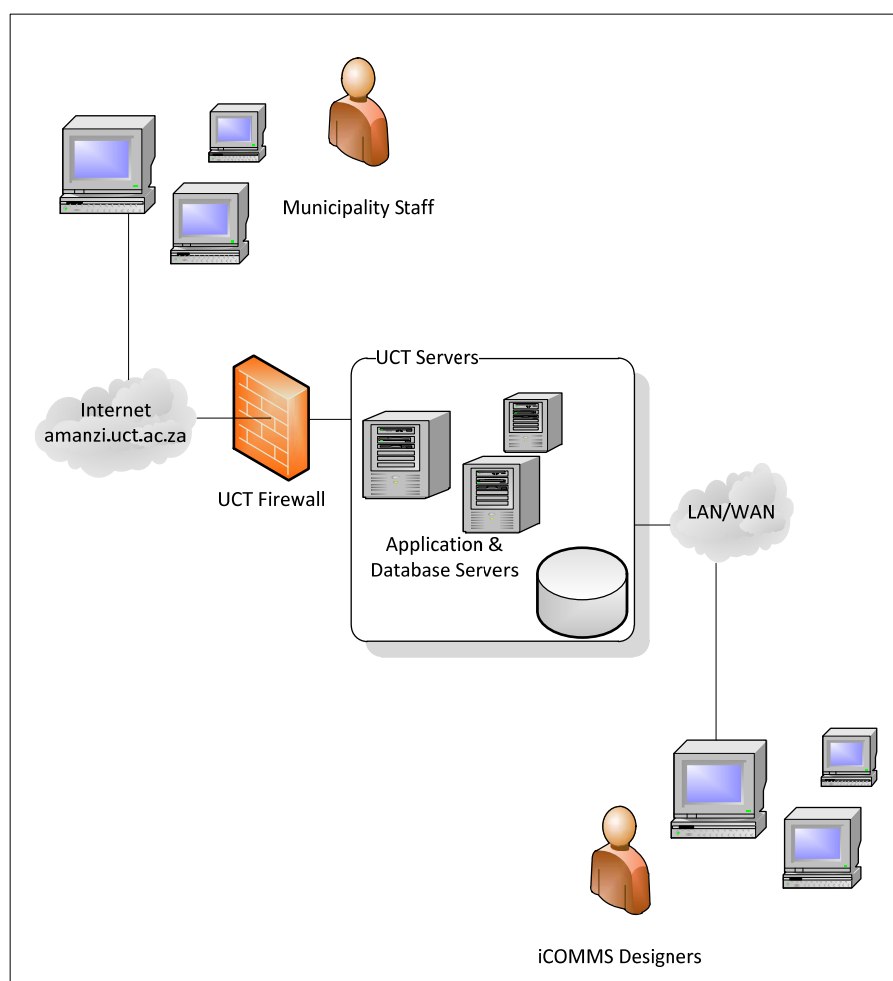
Figure 14: Access to amanzi.uct.ac.za

4.2   Implementing Amanzi

The system was implemented as described in Chapter 3.4.2 in both Municipality A and Municipality B. The system was presented to participants in order to obtain buy-in for the design. The toll-free lines were installed one month prior to the training workshop. A mobile phone was provided for each site to receive the PCM messages from citizens. Pamphlets were designed and translated into each language

for distribution in the municipality and at strategic points, such as libraries. Details and findings from the municipal workshops and community focus group meetings are given below.

4.2.1   Implementation: Municipality A (municipality office)

The Municipality A workshop was successful with involved and responsive participants. Only one run-through of the online database was required for everyone to understand. Repetition was not necessary. The responsible persons from the A1, A3 and A2 offices were present. The A3 satellite office indicated that there was no access to a computer. The communications officer assured the staff member that she had informed the IT department about this and that a computer with an Internet connection was to be organised shortly. To address the need for job cards that could be given to the technical team, the system was amended to allow exporting of such job cards.

There was a concern that citizens may abuse the PCM system and that the main office may suddenly receive an influx of calls from outlying towns. The responsible persons from the outlying towns were concerned that people would call the toll-free line and no longer walk into the satellite offices to lay their complaints. The research team agreed with the staff that this would be monitored throughout the project.

4.2.2   Implementation: Municipality A (communities)

In Municipality A, the communities of A1, A2 and A3 were trained on the system. The meetings had been organised by the community liaison person of Municipality A and a senior staff member from the municipal offices.

In A1, about 20 people came to the briefing session and 15 people took part in the focus interviews. Community members were very engaging and supportive of the project. Frustrations regarding the turnaround time for receiving feedback on delivery issues from the municipalities were raised. Pamphlets were left with the main municipal office and at the library.

In A2, about 25 people took part in the briefing session and 18 people took part in the focus interviews. Community members were enthusiastic, understood the pamphlets and offered to inform others in their community. Pamphlets were left with the information centre.

In A3, the meeting was well organised with 13 people taking part in the focus group interviews. Over 30 people attended the briefing session in the community hall. The group was enthusiastic about the project and pamphlets were left at the post office and at the local pharmacy.

4.2.3   Implementation: Municipality B (municipality office)

The training workshop for the Municipality B staff members was very successful. All representatives and responsible persons from the B1, B2 and B3 offices were present. In addition, a person from another satellite office who had heard about the project attended the workshop. The satellite office was subsequently added to the system as a satellite office despite not having been included formally in the research project.

During the training, it became apparent that the technical team would not be able to log into the database daily. Therefore, it was decided that for the satellite offices (B2, B3 and the additional satellite office), the technical team would be informed of new complaints by the staff responding to the call and logging the complaint. The responsible persons would then also update the database once complaints were completed. While this was a change to the originally intended workflow process, it responded to the local need.

A concern raised was that of calls coming in on weekends and public holidays. Prior to the ICT implementation, calls coming into the B1 office had been diverted to the Fire Department, which was on 24-hour standby. The Fire Department would then contact the technical team and inform them of the

details of the incident. The municipality stated that they are satisfied with their back-up plan for weekends and public holidays and the toll-free line was diverted to the Fire Department during this time.

4.2.4   Implementation: Municipality B (communities)

The system was introduced to each community in B1, B2 and B3. The communication officer of Municipality B arranged the meetings. The system was explained in the local language and it was highlighted to the community that they could use the toll-free line and the PCM system in order to have cost-free access to the municipality. In addition to the face-to-face meetings with the community, focus groups meetings and walkabouts were also held in the area. Pamphlets were distributed at central locations.

In B1, 20 people were present at the arranged meeting and 15 people took part in the subsequent focus group discussions. Findings from the interviews showed that none of the participants knew the public participation officer or community liaison person. General frustration with the municipality was expressed. However, all participants understood how to use the system. This was confirmed by database entries, which showed that the system was used immediately and extensively. Pamphlets were distributed to the general public and some were left at the main municipal office.

In B2, only seven people were present at the community hall meeting and it very quickly became clear that the meetings had not been organised in advance. However, the meeting continued and pamphlets were distributed afterwards at the clinic, school and to private households. The research team also engaged with the public and informed them in informal discussions and by distributing the pamphlets.

In B3, 15 participants were present for the arranged meeting and all participants took part in the focus group interviews. All participants understood the purpose of the study and how to report complaints. Frustration regarding the lack of feedback from the municipality was raised. Similar to the other communities, pamphlets were distributed to households, the library, two shops and the post office.

4.3   Evaluation of Amanzi

Using the methodology described in Chapter 0, Amanzi was analysed using the TAM model. Analysis of data showed that the ASU was influenced by the PU and PEOU of the system. The TAM analysis consisted of seven items (Table 3) that measured the PU (three items) and PEOU (five items). The results presented in Table 3 are based on the questionnaire distributed immediately after the training.

Table 3: Evaluation of ICT system after implementation

Factor	Results (%)
PU	Eight users suggested that the system would make a meaningful contribution to the municipality.
	Seven users said that they would recommend the system to another municipality.
	Six users said that the system would help complaints data management. Three users stated additionally that the system would help with easy report generation.
PEOU	Six users stated that the system was easy to use while one user stated that it is very easy to use.
	Five users stated the system functioned at an average speed, one user stated the speed was good, and another user stated that it was very good. One user stated that the system was slow.
	Four users stated that they would have been able to use the application without training while two users said they could not have used it without training.
	Four users (44%) stated that it was their perception that it would take them 30 minutes to understand the application while one user stated one hour and another user stated two hours.

The results showed that there was an overall experience of a high PU and PEOU. This had an impact on the users' attitude regarding the ASU. The number of users in the municipality may seem low; however, it has to be clarified that no more than one person is usually responsible for recording complaints. The system implementation resulted in staff being included in the complaints process more formally. The system changed the workflow environment of the municipality; its use was a reflection of the PU, PEOU and the subsequent ASU. Despite there only being a few system users in the municipality, they were an actual representation of the entire municipality based on their job function.

An assessment of the system usage using the login data and reports was done for each municipality from 1 November 2014 to 10 June 2015.

4.3.1 Municipality A

Municipality A logged a total of 429 complaints. After the first month of usage, the number of complaints dropped substantially in December 2014 and January 2015. It was confirmed with the municipality that this was mainly due to the December–January holiday season, which resulted in the system not being used with staff being on leave. It cannot necessarily be concluded that the actual number of complaints dropped during that time. There was no other record of complaints available. The municipality indicated that owing to citizens going on holiday, the number of complaints usually drops over the holiday period. The research team was not able to confirm this either way. The number of recorded complaints increased again in February 2015 after the research team enquired why no new complaints had been recorded since the end of January. The number of complaints remained relatively constant for March, April and May 2015. The last report was created from the system on 10 June 2015, at which stage 14 complaints had been registered for June 2015. The system continues to be used.
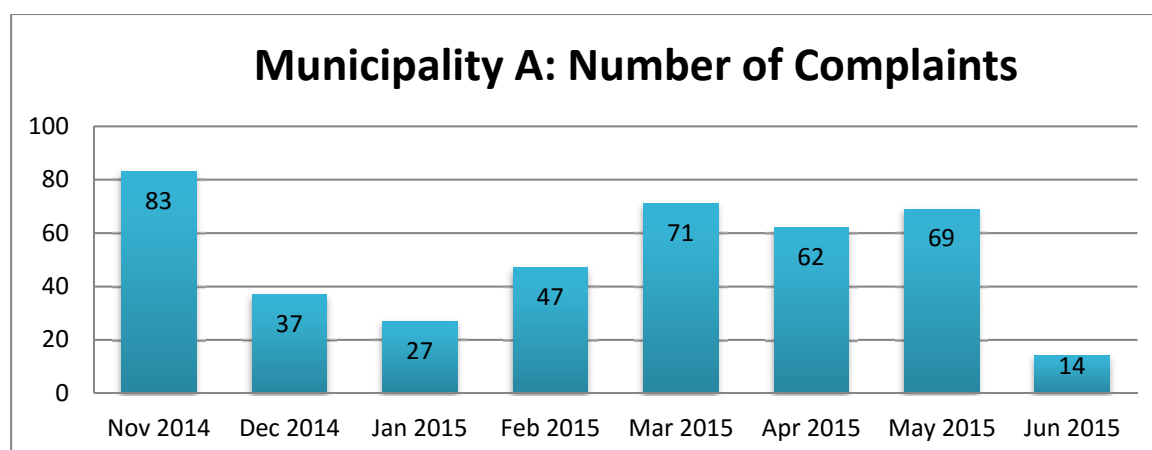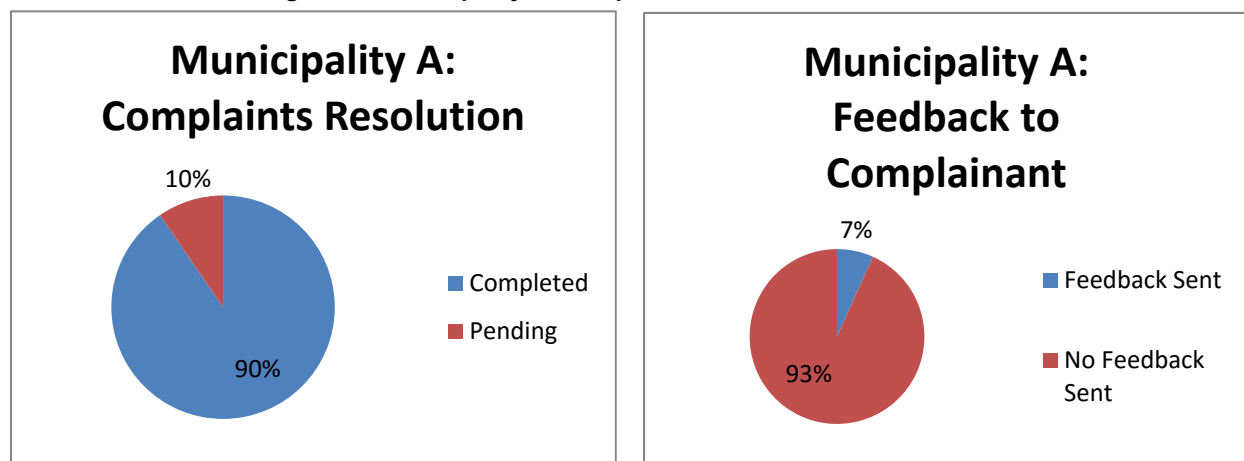

Figure 15: Municipality A: Number of complaints recorded

When Municipality A started using the system, it was noted that many of the complaints did not have a full set of contact details entered into the complaint details. The main missing data set was the contact number for the complainant. An interesting finding was that the complaints where a contact number had been uploaded, were the ones that had been resolved. This defeated one of the key purposes of the system of providing citizens with feedback and a reference number, which they could use for follow-up. To establish the reason for the changed use of the system, an investigation with the municipality and users showed that the system usage had changed owing to a process change in the municipality. This process change was developed after the implementation in order to use the system in the most efficient way within the municipality. Complaints were not uploaded when a citizen raised the issue, but rather when the issue had been resolved. This resulted in a 'batch-upload' to the online system every Monday morning. The technical teams were out in the field resolving complaints during the week based on information given to them by the various offices. The teams did not return to the main office between

complaints and did not keep the main office informed of progress. Therefore, complaints were only uploaded post-completion.

This was confirmed by the low percentage (7%) of feedback sent to citizens (Figure 16). That said, the municipality recorded 90% of its complaints as completed. The system purpose had been adapted post-design to suit the municipality's need of becoming a database or storage system rather than a complaints management system that would provide feedback to citizens. While the municipality has adopted the system, it has also adapted it to suit its own need – potentially ignoring the need of the citizen to receive feedback. However, the engagement with the municipality also showed that the human resource for complaint management was so limited that it often had to be dealt with in an ad hoc modus.

Figure 16: Municipality A: Complaint resolution and feedback

4.3.2 Municipality B

In Municipality B, 405 complaints were logged during the study period. As with Municipality A, enthusiasm for the system was high and therefore a relatively high number of complaints were recorded in November 2014. During December 2014 and January 2015, usage and recording of complaints dropped, despite Municipality B being a holiday destination, which results in an increase of citizens. The municipality had indicated during the design phase that in previous years, the number of complaints had increased during the holiday season owing to holidaymakers lodging complaints. It cannot be confirmed whether the number of complaints was higher than usual since there is no additional record of complaints besides the system record. One potential explanation is that owing to staff being on leave, there is a perception of complaints increasing since the limited staff number results in greater pressure on the municipality.

The number of recorded complaints increased in February 2015 when the full staff complement had returned from leave, remained constant for March 2015 and dipped slightly in April and May 2015. Five complaints had been recorded for June 2015 at the time of creating the last report on the system.
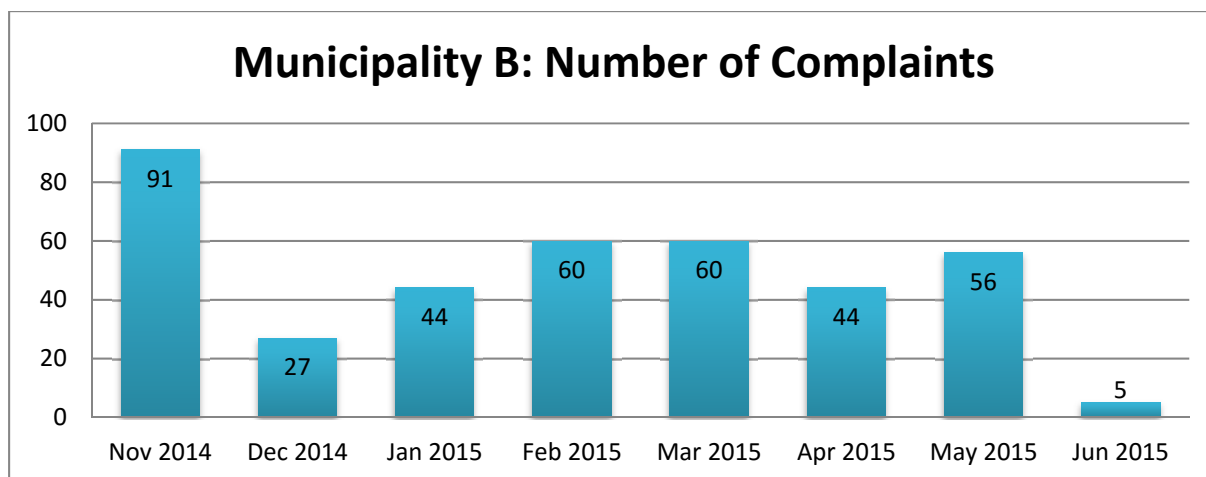
Figure 17: Municipality B: Number of complaints recorded

Municipality B adopted the system more closely to its original intention as a complaints management system. For most complaints recorded, feedback and a reference number were sent via SMS to the complainant. Citizens who did not receive feedback had either not provided a contact number or the number entered was a landline, which had not been accommodated as a feedback line for the SMS. Municipality B had more complaints recorded as 'pending' rather than 'complete' (Figure 18). The municipality attributed this to neglecting to update the status of complaints on the system rather than the complaints not having been resolved. The assessment of the usage of the system showed that Municipality B was able to adopt the system in a more coherent way owing to having a single person responsible for complaints registration and management as part of the customer relations portfolio in the municipality.
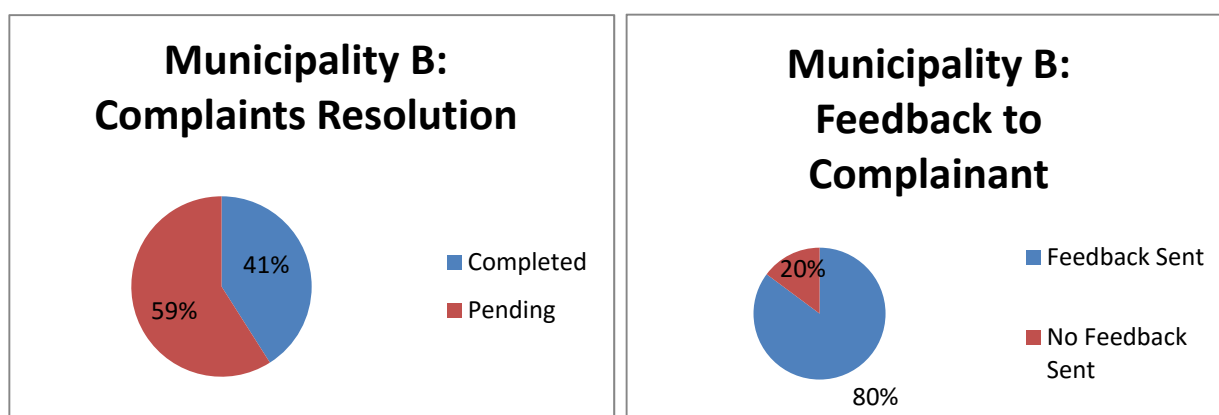

Figure 18: Municipality B: Complaint resolution and feedback

4.4   Conclusion

Users influenced the uptake and use of the system. Municipal management recognised aspects of the system that had been developed based on their requests. The co-design approach also ensured that the system responded to the low-cost and low-maintenance requirements and was designed according to the needs and abilities of each municipality and the community.

While the use of the co-design approach ensured that all stakeholders were included in the design and uptake of the system, the design process had its own challenges, such as the logistics of organising meetings with all stakeholders and identifying representative groups. The introduction of the toll-free line and the PCM as a method to ensure 'free-at-the-point-of-use' was crucial for the implementation and buy-in from both the municipality and community.

The change of system usage after the implementation in Municipality A showed that the users and the municipality were not able to express a detailed workflow prior to the implementation. Constraints on using the system as per the original conception only became apparent when the system had been implemented and was used on a daily basis. While the municipalities were motivated to use the system, they were equally constrained by their own resources. The holiday periods showed that municipalities were not always able to replace system users and responded to workflow challenges with previously established methods, such as the batch uploads. Overall, the system usage dropped after the first months of use. However, it was not abandoned by the municipality and is still being used.

5   DISCUSSION OF FINDINGS

This chapter provides a discussion on the findings and highlights the lessons learnt.

The study set out to assess whether communities can be incentivised to play an active role in the management of water supply delivery by reporting interruptions or problems to the relevant municipality. The literature review had indicated that incentivisation does not necessarily require being monetary, but those aspects such as the experience of being a citizen and part of the governance structure may result in a greater engagement. Recognising the social structures in rural communities, the resource constraints of rural municipalities and the geographically challenging environment, it was hypothesised that the use of an ICT system may allow an increase of engagement in order to motivate citizens to contribute and provide municipalities with the relevant information. The research was of particular importance in South Africa where service delivery protest actions have resulted in social unrest, vandalism and a breakdown of relationships between communities and municipalities.

Amanzi's design was based on a co-design approach, which was of great benefit for all stakeholders, including the research team. While co-design requires ongoing engagement that can be administratively difficult, it proved to be a well-suited method. Participants felt that their views were taken seriously and were integrated in the system. The research team was made aware of challenges by recognising local staff and community members as experts. The system design turned out to be technically simpler than originally intended, but this confirmed the notion of co-design since the municipalities were able to use the system and maintain it. The concerns that municipalities had highlighted of the system being abused was not confirmed during the six-month assessment period. The overall costs for the toll-free line remained at approximately R400 per month per municipality.

As the analysis of the municipalities showed, the implementation of the ICT intervention brought about changes to the way complaint information was handled. All reported complaints were recorded into the system and the municipal staff could retrieve the information whenever they needed it. Some municipalities recorded complaint information in batches.

The experience of community members varied in each of the study sites. This confirmed the view that participation and governance are locality specific and should be designed to respond to local needs. In order to increase the ability of municipalities to engage productively and incentivise communities to resolve water and sanitation issues, it is of the utmost importance to adopt methods that are specific or deemed more favourable to each town. While this is a time-consuming task, it was shown that the combination of a variety of methods may be more productive than a single method approach. The methods used should consider vulnerable population groups who might not be able to physically attend meetings, the older generation, and working people who might only be able to attend meetings in the evening or weekends. Methods such as loud hailers and public meetings are useful if they are implemented appropriately. The reliance on community members informing each other is less successful than often assumed.

Despite the differences in views on the various community engagement methods, there were similarities, such as the participants' preference of traditional engagement methods despite the indicated low level of satisfaction with these methods. This highlights the relevance of culture norms of a society, and the value and need for face-to-face interaction. It became apparent that community members feel more certain that their problem has been heard when they have the opportunity to speak to a person face-to-face and are able to identify that person as the one accountable for resolving the complaint. This was most obvious in the towns that had a plumber or ward councillor residing within the community who was viewed as accessible and responsible to all. A number of participants preferred to use the toll-free line rather than to send an SMS for similar reasons as to the face-to-face engagement. It was felt that talking to someone directly provided a sense that the problem has been noted.

The participatory mechanisms that most participants felt achieved most of the public participation goals were focus groups and public meetings. Mechanisms that promoted two-way communication and self-representation were most preferred in the study sites. Such mechanisms tend to have a higher chance of building trust, giving the participants an opportunity to express themselves, engage with the municipality and discuss conflicting matters.

The effectiveness of any participatory mechanism is affected by the quality of the management of the process. It is essential that those facilitating the engagement recognise the crucial need for information and feedback to the community. Secondly, awareness of the power struggle between the community and municipality, and between the ward councillors and community is important to understand the impact an intervention may have. Interviews showed that participants in some study sites were more open to disclose information about their experience when the ward councillor or public liaison person was not present. Whichever participatory mechanism is used, it needs to be conducted in a manner that enables all parties to express their view in the decision-making process.

Ward councillors and ward committees played a pivotal role in public participation as they were either enablers of, or barriers to positive engagement. The quality of the relationship between ward councillors and communities had an impact on the engagement of the public. Where there was an open and trustful relationship with the councillors and leaders, there was a higher degree of satisfaction with the engagement processes. As a result, the mechanism (ward committees and councillors) seemed to achieve more goals.

Despite pamphlets being distributed relating to the public meetings and focus groups being held in the study sites to announce the initiation of the project, there still seemed to be a breakdown in communication and a lack of initiative from both the community and the municipality. Most community members said they did not hear about the implementation of the ICT and those who did, forgot to spread the news to others. While the municipality staff was aware of the new reporting system, some of the community leaders had not been informed. As a result, not enough was done to ensure that key members in each community knew about the project in order to pass on information to other community members. Despite a reasonable number of staff from the municipality being involved, system implementations require ongoing engagement with both municipalities and communities, which results in high costs being incurred.

6 CONCLUSIONS AND RECOMMENDATIONS

At the start of this document, six specific aims for the research project were defined. In this chapter, the findings relating to the aims of ICT system design, implementation and evaluation are discussed. The chapter concludes with recommendations for future projects based on the learnings from this one.

6.1 Aim 1: Successes and Failures of Incentivising Community Engagement

The literature review set out by outlining water service delivery in South Africa. It was shown that while the sector had gone through substantial changes since 1994, there was still a backlog of delivery in rural areas. Public engagement was highlighted as an area of legislative requirements which has been a challenge in the underresourced provinces of South Africa.

Since the project's aim was to increase public engagement, the literature review continued with an analysis of public consultation within the context of service delivery and development. It was shown that public consultation is part of the legislature for local governance and a constitutional right of citizens in South Africa. An analysis of the literature regarding the challenges of public participation in service delivery indicated that aspects such as insufficient resources, process implementation and accountability result in the public participation process being only partially implemented.

The role of ICTs was analysed with a particular focus on assessing the use of mobile phones and development, as well as understanding the overly positive attitude that ICTs will provide a new avenue for public engagement processes. It was highlighted that ICTs and mobile phones can play a major role in increasing access to information and improving certain aspects of governance, such as service offerings like payment of bills. It was also highlighted that the SALGA has recognised the need for an ICT governance policy that highlights the challenges that ICTs can bring when implemented without the necessary resources.

6.2 Aim 2: Research Methodology

The methodological approach of the study was an intensive case study with an intervention in order to explore potential change. Since the study entailed several aspects ranging from community engagement to ICT system design and municipal capacity assessment, it was decided to use different methodologies for each of these aspects.

Two rural municipalities in the Eastern Cape were selected based on a set of rurality criteria. During the first discussion, the research team assured itself that the municipalities were in a position to support the research without impact on their limited resources. Six field study sites for the communities were chosen based on the requirements of the municipalities. While these were three more than originally anticipated, it was felt that this would be of benefit to the municipality. An analysis of the field sites showed that there were substantial challenges in water and sanitation service delivery.

The methodology for the design, development, implementation and evaluation of the ICT system were based on a co-design approach. This approach relies on municipalities and communities becoming designers in collaboration with the research team. The implementation for the system was done through training sessions in each of the municipalities and the relevant communities. The evaluation of the ICT system was done using the TAM described by Davis (1989). PU and PEOU were evaluated to understand how the system was used in the municipality.

In order to analyse the impact of the ICT intervention, communities and municipalities were assessed using the above-mentioned methods prior to the implementation and again six months after the implementation in order to assess the impact.

6.3   Aim 3: Analysis of Community Engagement

The municipalities and community members were interviewed at the outset of the study to understand challenges that impacted the practices of engagement and the challenges in service delivery.

Municipality A highlighted that limited financial and human resources resulted in its inability to respond timeously to service delivery challenges. Municipality A relied on external service providers to support lacking internal skills. Lack of information was identified as a hindrance for the municipality as well as citizens. The municipality had the expectation that the ICT intervention would bring the necessary change to improve service delivery.

Municipality A showed that several enablers for the implementation of an ICT system existed. Social media and communication strategies were available, willingness to co-operate was high and the satellite offices functioned as information hubs. Barriers to the implementation were the substantial lack of IT skills, the limited customer service experience and the limited human resources. The community engagement processes in Municipality A were done in the three towns named A1, A2 and A3. The main method of engagement between the municipality and its community was via public meetings and loud hailers. The communities perceived loud hailers to be ineffective since they were a one-way engagement that did not allow feedback from citizens. The engagement with ward councillors differed between the towns and clearly depended on the positive nature of the relationship between councillor and community.

Municipality B was interviewed at the same time as Municipality A and meetings were organised with the communities of B1, B2 and B3. The municipality identified interdepartmental communication breakdown as the main reason for communities not receiving notifications on water- and sanitation-related matters. It was hoped that the ICT intervention would support the municipality in improving this aspect. Municipality B had a substantial benefit in having an established complaints management process and a dedicated staff member to manage these complaints.

Barriers to a system implementation were similar to those in Municipality A, namely, the lack of IT skills and a low level of customer service experience. The analysis of the community engagement method showed that loud hailers and public meetings were used to communicate with the community. Participants in B1 felt positive about public meetings, while participants in the other towns highlighted the fact that the meetings required better organisation. Ward committee meetings and engagement with councillors were the least valued methods. Community members also highlighted the fact that there was not enough opportunity to provide feedback in the established methods of engagement.

6.4   Aim 4: Incentive Structures

Aim 4 focused on identifying incentive structures that would encourage the communities to engage proactively with the municipality. This was done in collaboration with the community and municipality. Key incentives for the communities were identified in conjunction with ICT implementation. These were identified as:

- The logging of complaints had to be free of cost to the citizens.
- Feedback on complaints should be received within 24 hours.
- A variety of methods of laying a complaint should be possible.
- Engagement with the municipality should be two-way rather than one-way of pushing information only.

These aspects were integrated into the design of Amanzi.

6.5   Aim 5: Development and Implementation of ICT

Aim 5 was addressed to develop and implement a mobile phone tool and an incentive structure, and to observe the use for six months. The engagement with the municipalities and the communities highlighted that a mobile phone tool was of less value than a generic ICT tool that allowed a coherent collection of complaints laid. Action research that is based on developing interventions has been shown to deviate from originally intended designs. It was felt that it was more important to recognise the local needs than to develop a system that had been perceived by the research team as potentially relevant. While the change to an ICT system was a deviation from the original project plan, it was not experienced as such a substantial deviation that should result in discontinuing with the project. The ICT tool was developed in collaboration with the communities and municipalities and responded to the identified needs. A toll-free line was established to allow a cost-free complaints registry and a PCM line allowed citizens to use their mobile phones to request a return call. The system also responded to the requirement to provide feedback to citizens by agreeing with municipalities on a revised process when lodging complaints. The system was web-based with access given to the relevant stakeholders, including councillors and community development workers. The database was housed at the UCT to ensure ongoing maintenance. The system was implemented at Municipality A and Municipality B using training workshops in each municipality. The communities were informed of the system through public meetings, focus group sessions and pamphlets.

The ICT evaluation showed that there was a high experience of PU and PEOU for the municipal staff. Municipality A registered 429 complaints in the six-month period with a substantial drop in recording complaints in the December and January period which was ascribed to staff being on leave. Municipality A adapted the use of the system by changing it to a database where complaints were stored subsequent to having resolved the matter. This was done because the municipalities were not able to adapt to the revised process of logging complaints as and when they were raised. Contact numbers of complainants were not recorded, which resulted in the community members not receiving feedback.

In Municipality B, 405 complaints were logged during the study period. Similar to Municipality A, the recording of complaints dropped substantially in the December and January period despite Municipality B being a holiday destination. The municipality had indicated that during this period, a higher number of complaints were usually received, but this was not confirmed on the system. A potential explanation could be that the complaints were not recorded formally owing to staff being on leave. Both municipalities were equally constrained by their resources of using the system but adapted it to their own needs. The municipalities did not remain committed to the original process change of providing feedback to the citizens but have continued using the system beyond the study period.

6.6   Aim 6: Enablers and Barriers to ICT

Aim 6 of the study focused on identifying enablers and barriers to the use of ICTs and incentives based on the findings of the field study. The experiences of the municipality and the communities in Municipality A and Municipality B were assessed to understand whether the ICT did improve the challenges that had been highlighted prior to the design. Municipality B performed better in providing feedback to citizens, which was ascribed to a complaints process being in existence prior to the system implementation. Municipality A resolved most complaints and had few 'pending' complaints.

In both municipalities, the system was of greater benefit to the municipal staff than it was to the communities. The hope that information would be shared easier between departments was not confirmed during the six-month period. Councillors were identified as potential gatekeepers who avoid handing out the toll-free numbers in order to remain informed of the challenges in their wards. Community members continued using the traditional methods of complaints, i.e. telephone calls and face-to-face engagement in municipal offices. It became apparent that municipalities did not advertise the system as they had originally committed, and community members remained uninformed.

6.7   Concluding Remarks and Recommendations

This project showed that ICT systems can support complaints management in municipalities and that such systems can result in a measurable improvement of adaptive capacity. However, the impact and the improvement are arguably not enough to leave either municipalities or the communities in a better position to adapt and respond effectively to the changes. This does not necessarily mean that an ICT is not useful in order to improve the municipal processes, but implementing any system in a rural resource-constrained environment should be done cautiously, focusing on the changes that can be achieved when considering the resource limitations. An ICT is not a guaranteed solution that can compensate for resource limitations, which result in water and sanitation issues not being addressed. The study highlighted the fact that Amanzi improved the overall knowledge and data tracking, but that it could not improve the effectiveness with which complaints raised by citizens were resolved.

Overall, the system was of greater benefit to the municipality than to the community. It allowed the municipality to track the number of complaints and, as the final interviews showed, all municipality staff appreciated the graphs and visual representation of workload, issues resolved and feedback sent. For both municipalities, the system allowed an overview of actual number of complaints for the first time, rather than anecdotal evidence from individual staff members. This resulted in both municipalities staying committed to using the system beyond the end of the project.

The greatest benefit for the communities was the toll-free line, which allowed complaints to be lodged without incurring costs. This is an important finding, since it is a simple tool that can be implemented at relatively low costs and that sends a clear signal to the community that there is a commitment from the municipality to hear citizen complaints. The concern that had been raised by municipalities that such a toll-free line would be abused, was not confirmed in the study.

Assessing conclusively whether the ICT tool resulted in incentivising communities to report and engage with the municipality has not been possible for either of the municipalities. In Municipality B, a greater number of citizens felt heard, while in Municipality A there was still an experience of certain areas receiving preferential treatment, and trust not having been established to an extent where it could indeed foster improved engagement.

Both municipalities have continued using the system beyond the study period and the database will remain open for their purpose (use?) for the foreseeable future. The municipalities have been made aware that the research team will provide support to move the database to local premises if required. It has also been clarified that the toll-free line will be discontinued should municipalities decide not to take over the monthly cost.

For future projects it is important to highlight that action research is complicated when requiring communities to engage proactively with a system. In certain towns, community members expressed the view that they felt they should be paid for contributing to the study. This is a reasonable request when considering that there is an expectation on the side of the researchers to receive feedback and take time from the community. While it had been made clear from the outset of the project that there would be no remuneration for participation, it should be kept in mind for future projects that aspects like this have to be negotiated upfront.

BIBLIOGRAPHY

Abbot, J. & Guijt, I. 1998. Changing views on change: Participatory approaches to monitoring the environment, *SARL Discussion Paper*, ISSN 1560-2192.

Ball, M., Rahman, Z., Champanis, M., Rivett, U. & Khush, R. 2013. Mobile data tools for improving information flow in WASH: Lessons from three field pilots, 1–13. Retrieved from http://www.aquaya.org/wp-content/uploads/Ball-et-al_Mobile-data-tools-for-improving-information-flow-in-WASH.pdf

Bhavnani, A., Won-Wai Chin, R., Janakiram, S. & Silarsky, P. 2008. *The role of mobile phones in sustainable rural poverty reduction*. ICT Policy Division Global Information and Communication Department (GICT).

Buccus, I., Hemson, D., Hicks, J. & Piper, L. 2007. Public participation and local governance, Centre for Public Participation, South Africa.

Castells, M. 2012. *Networks of Outrage and Hope*. Cambridge, UK: Polity Press.

Champanis, M., Rivett U., Gool, S. & Nyemba-Mudenda, M. 2013. ICTs in the water sector: Where do we stand? WRC Report No. TT 571/13, Water Research Commission, Pretoria.

Denscombe, M. 2010. *The Good Research Guide*. Maidenhead, UK: Open University Press.

Department of Water Affairs (DWA). 2010. *Blue Drop Report 2010 South African Drinking Water Quality Management Performance*. Department of Water Affairs, Pretoria, South Africa.

Department of Water Affairs (DWA). 2012a. *Blue Drop Report 2012 South African Drinking Water Quality Management Performance*. Department of Water Affairs, Pretoria, South Africa.

Department of Water Affairs (DWA). 2012b. *Sanitation Services: Quality of Sanitation in South Africa Report on the Status of Sanitation Services in South Africa*. Department of Water Affairs, Pretoria, South Africa.

Department of Water Affairs and Forestry (DWAF). 1994. *Water Supply and Sanitation Policy White Paper*. Republic of South Africa.

Department of Water Affairs and Forestry (DWAF). 2003. *Strategic Framework for Water Services*. Republic of South Africa.

Donner, J. 2005. Research approaches to mobile use in the developing world: A review of literature. Submitted to the *International conference on Mobile Communication and Asian Modernities.*

Donner, J. 2008. Research approaches to mobile use in the developing world: A review of the literature. *The Information Society*, *24*(3), May 2008. Retrieved from http://dx.doi.org/10.1080/01972240802019970.

Feldman, Y. & Lobel, O. 2009. The incentive matrix: The comparative effectiveness of rewards, liabilities, duties and protection for reporting illegality. *Texas Law Review*, 87, May 2010. San Diego Legal Studies Paper No. 09-013. Retrieved from SSRN: http://ssrn.com/abstract=1415663 or http://dx.doi.org/10.2139/ssrn.1415663.

Franceys, R. & Gerlach, E. 2011. Consumer involvement in water service regulation. *Utilities Policy*, *19*(2011).

Gool, S. 2011. Media coverage on people's perception of drinking water. Department of Civil Engineering, University of Cape Town, Cape Town.

Hellström, J. 2008. Mobile phones for good governance: Challenges and way forward. Retrieved from http://www.w3.org/2008/10/MW4D_WS/papers/hellstrom_gov.pdf.

Hohmann, N. & Janssen, M. 2012. Addressing global sustainability challenges from the bottom up: The role of information feedback. The Center for the Study of Institutional Diversity resides in the School of Human Evolution and Social Change at Arizona State University.

Hudgson, K. & Manus, L. 2006. A drinking water quality framework for South Africa. Retrieved from www.ewisa.org.

InfoDev. 2012. Mobile usage at the base of the pyramid in South Africa. International Bank for Reconstruction, The World Bank.

Lado, C. 1997. Socio-economic factors influencing sustainable water supply in Botswana. *GeoJournal*, 2011, *41*(1).

Lindfors, H. 2011. Drinking water quality monitoring and communication in rural South Africa, Thesis, Civil and Environmental Engineering, Chalmers University of Technology, Sweden, Goteborg, Sweden, 2011.

Mamdani, M. 1996. Citizen and subject: Contemporary Africa and the legacy of late colonialism. *Princeton Series in Culture, Power, History*, 1996.

McDonald, D. & Pape, J. 2002. *Cost Recovery and the Crisis of Service Delivery in South Africa*. Pretoria: HSRC.

Patil, D.A. 2011. Mobile for health (mHealth) in developing countries: Application of 4 Ps of social marketing. *Journal of Health Informatics in Developing Countries*. [Accessed 13 December 2012].

Poblet, M. 2011. Rule of law on the go: New developments of mobile governance. *Journal of Universal Computer Science*, 17(3).

Republic of South Africa (RSA). 1996. *Constitution of the Republic of South Africa, Act 108 of 1996*. Pretoria: Government Printers.

Rivett, U., Champanis, M. & Wilson-Jones, T. 2013a. Monitoring drinking water quality in South Africa: Designing information systems for local needs. *WaterSA, 39*(3). WISA 2012 Special Edition 2013.

Rivett, U., Marsden, G. & Blake, E. 2014a. ICT for development: Extending computing design concepts. In B. Cooper & R. Morrel (Eds.), *Africa-centred Knowledges: Crossing Fields and Worlds* (pp. 126–141). Suffolk: Boydell & Brewer.

Rivett, U., Taylor, D., Chair, C., Forlee, B., Mrwebi, M., Van Belle, J-P. & Chigona, W. 2014b. Community engagement in drinking water supply management: A review. WRC Report No. K5/2114 (pp. 1–67). Water Research Commission, Cape Town. doi:978-1-4312-0506-8.

Rivett, U., Taylor, D., Van Belle, J-P., Chigona, W., Maphazi, N. & Forlee, B. 2013b. An assessment of incentivising community engagement in drinking water supply management. WRC Report No. K5/2114 (pp. 1–7). Retrieved from http://www.wrc.org.za.

Sheth, A., Russo, E., Menon, M., Wannemuehler, K., Weinger, M., Kudzala, A., Tauzie, B., Masuku, H., Msowoya, T. & Quick, R. 2010. Impact of the integration of water treatment and handwashing incentives with antenatal services on hygiene practices of pregnant women in Malawi. *The American Journal of Tropical Medicine and Hygiene, 83*(6).

Smith, J.A. & Green, J.M. 2005. Water service delivery in Pietermaritzburg: A community perspective. *Water SA, 31*(.4).

South African Bureau of Standards (SABS). 2006. *South African National Standard Drinking Water SANS 241,* South Africa.

Souza, P., Hugo, W., Wensley, A. & Kuhn, K. 2009. eWQMS new developments: Use of a systems engineering process to aid improved data quality assurance. Emanti Management, Stellenbosch, South Africa.

Tsatsire, I. 2008. A critical analysis of challenges facing developmental local government: A case study of the Nelson Mandela Metropolitan Municipality. Unpublished thesis for the degree of Doctor of Philosophy (Public Administration), Nelson Mandela Metropolitan University, Port Elizabeth.

United Nations Development Programme (UNDP). 2012. *Mobile technologies and empowerment: Enhancing human development through participation and innovation.* Retrieved from http://undpegov.org.

World Bank. 2012. Information and communications for development 2012: Maximizing mobile. Washington, DC: World Bank, DOI: 10.1596/978-0-8213-8991-1.

Zhuwakinyu, M. 2012. Water 2012: A review of South Africa's Water Sector. *Creamer Media's Water Report.*

APPENDICES

Appendix A: Process Description of Municipal and Community Engagement

The process of initiating engagement with district municipalities, local municipalities and communities was as follows:

1. Identify rural district municipalities and assess current water supply challenges through Blue Drop and Green Drop status. Analyse media reports for the study area.
2. Contact district municipalities explaining the study and request a meeting.
3. Meet with district municipality to discuss details of the project:

    1. Explain study in detail.
    2. Highlight expectations of research team.
    3. Highlight possible benefits to communities, local municipality and district municipality.
    4. Explain process of engagement with local municipalities and communities.
    5. Provide details on the expected resource requirements (mainly time of staff and ability to respond to community concerns).
    6. Assess together with the district municipality whether local municipalities and district municipality as well as communities will be able and willing to participate in the study.
    7. Request subsequent meeting with local municipalities.
    8. Request information on the process of receiving formal acceptance of the study in the district municipality as well as requirements for ethical approval.
    9. Request for the district municipality to identify relevant stakeholders who have to be informed throughout the study (e.g. provincial departments and mayoral committees).

4. Meet with local municipalities to discuss details of the project:

    1. Explain study in detail.
    2. Highlight expectations of the research team.
    3. Highlight possible benefits to communities, local municipality and district municipality.
    4. Explain process of engagement with municipal employees and communities.
    5. Provide details on the expected resource requirements (mainly time of staff and ability to respond to community concerns).
    6. Assess together with the local municipalities whether the municipal offices and the communities will be able and willing to participate in the study.
    7. Request for local municipality to facilitate meetings with the community representatives and other appropriate stakeholders to outline project.
    8. Request information on the process of receiving formal acceptance of the study in the local municipality as well as requirements for ethical approval.
    9. Request for the district municipality to identify relevant stakeholders who have to be informed throughout the study (e.g. technical departments and mayoral committees).

5. Meet with community representative and other identified stakeholders:

    1. Explain study in detail.
    2. Highlight expectations of the research team.
    3. Highlight possible benefits to communities, local municipality and district municipality.
    4. Explain process of engagement with communities, community leaders and municipal employees.
    5. Provide details on the expected resource requirements (mainly time of community members and willingness to participate in reporting water supply challenges).
    6. Assess together with stakeholders' willingness of the community to participate and analyse possible ethical or operational difficulties.
    7. Request for community representatives to guide the process and facilitate meetings with the community.
    8. Request information on the process of receiving formal acceptance of the study from the community as well as requirements for ethical approval.

Request for community representatives to identify relevant stakeholders who have to be informed throughout the study and the appropriate means to keep community members informed.

Appendix B: Municipality Questionnaire 2014

Topic Guides WRC K5/2214: Municipal Visits between 31 March 2014 and 04 April 2014

The objectives of the visit to the municipality are as follows:

1. An assessment of the current municipal structure and the work/information flow of addressing service delivery issues (includes aspects of governance and policy).
2. An assessment of the relationship and communication strategies between the municipality and the people.
3. An assessment of existing technologies (ICTs) in the municipality.
4. Assessment of current challenges and possible solution identified by the municipality.

In order to respond to the objectives, we would like to interview the relevant stakeholders in the municipality.

A more detailed breakdown of the topics that will guide the interviews is as follows:

1. *Municipal Structure (interviewer Mr Carl Jacobs)*
   In this section we would like to get to know the municipality to gain insight and context. Aspects of this would entail understanding the administrative structure in the municipality, the flow of responsibility, resources and staffing (organogram) and the overall vision, strategy and culture.

2. *Water and Sanitation (interviewer Ms Bianca Forlee)*
   In this section we would like to meet with the relevant departments responsible for delivering water and sanitation services, which could include stakeholders from the technical teams, environmental health officers, the director of water and sanitation services, etc. We would like to understand how the departments interact as well as how obligations and feedback to provincial and national government are currently managed. We would also like to discuss the Blue and Green Drop Reports.

3. *Service Delivery (interviewer Mr Carl Jacobs)*
   In this section we would like to understand the experience of the municipality regarding service delivery expectations of the community. We would also like to assess how communities currently engage with the municipality in order to report faults, and the overall performance and assessment of service delivery in the municipality.

4. *Customer Relations (Ms Bianca Forlee)*
   Customer relation management is a very important aspect of this research and in this section, we would like to understand the process of engagement with the community. This would involve understanding the local context (e.g. the number of meetings, the platforms for engagement, the distribution of information). We would also like to gain insight into the municipality's perception of the current engagement with the community and the possible incentives for communities to contribute.

5. *Current Information Systems (Prof. Ulrike Rivett)*
   In this section we would like to understand which technologies or information systems are currently being used in the municipality. We would like to understand how information is being distributed, the level of local IT staffing and skills, as well as possible IT solutions the municipality has considered in the past.

Appendix C: Community Questionnaire May 2014

Individual Questions		
Municipal Structure		
1. Do you know who your Mayor is?	Yes	No
2. Do you know who your Municipal Manager is?	Yes	No
3. Do you know who your Public Participation Officer is?	Yes	No
4. Do you know about the Municipality's IDP? If Yes, have you read it? Did you know that you can contribute toward the drafting of the IDP?	Yes Yes Yes	No No No
Water and Sanitation		
1. What type of toilet do you use? Chemical toilet Bucket system VIP latrine Pit latrine Urine-Diversion toilet Flushing toilet Communal toilet		
2. Do you consider a VIP toilet to be a decent sanitation system?		
3. Is your toilet properly maintained?		
4. Have you or anyone in your community suffered from the following waterborne diseases? Malaria Cholera Dysentery Diarrhoea Bilharzia		
5. How do you access water in your household?		
Customer Relations		
1. How often do you attend public meetings? Why?		
2. Are the meetings held in a language you understand? Which language? Xhosa Afrikaans English	Yes	No
3. Are the meetings held at a convenient time and is it easy for you to travel to the meetings?	Yes	No
4. Do you read the municipality notice boards?	Yes	No

5. Have you reported a fault before? If Yes, what type of fault? Pipe burst Leaks No water flow Dirty water Low pressure Pipe blockage Other…	Yes	No
6. How did you report the fault? Telephone Mobile phone Email SMS Other…		
7. Was the problem resolved as a result of reporting the fault? If Yes, how long did it take for the problem to be fixed?	Yes	No
Current Information Systems		
1. Do you have a mobile phone? If Yes, what type of mobile phone do you use? How long have you been using the phone? If No, do you know someone who has a mobile phone and lets you use it (in an emergency situation, for example)?	Yes Yes	No No
2. How much airtime do you use per month?		
3. Do you use SMSs?	Yes	No
4. How do you access the Internet? Mobile phone Home Work Neighbour/Friend Internet café		
5. Which social media do you use? Facebook Twitter Instagram WhatsApp MXit None		
6. How often do you use social media?		
7. Do you access Social Media through your mobile phone or computer?	Mobile phone	Computer

8.	Do you know what the municipality's contact number is or whom to contact when there is a water and/or sanitation problem in your community?	Yes	No

Group Questions

Questions		
Municipal Structure		
1. How do you get feedback on the water and/or sanitation issues that you have reported?		
2. How long do you think it should take for a problem to be fixed? 1 week 2 weeks 3 weeks 1 month More than 1 month		

Comments:………………………………………………………………………………………………………
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Water and Sanitation		
1. Which type of toilet is the most common in your community? Chemical toilet Bucket system VIP latrine Pit latrine Urine-diversion toilet Flushing toilet Communal toilet		
2. What is your view of the current sanitation system in your household and your community?		
3. Are you able to maintain your toilet system? (financially and in terms of the technical skills that may be required)	Yes	No
4. Who is responsible for maintaining the sanitation and water systems in your community?		
5. Who is currently maintaining the toilet systems in your community?		
6. Have you been educated or informed of the right health and hygiene practices with regard to water & sanitation? If Yes, by whom?	Yes	No
7. Do you experience water shortages in your community? How often? Daily Weekly Monthly Other…	Yes	No
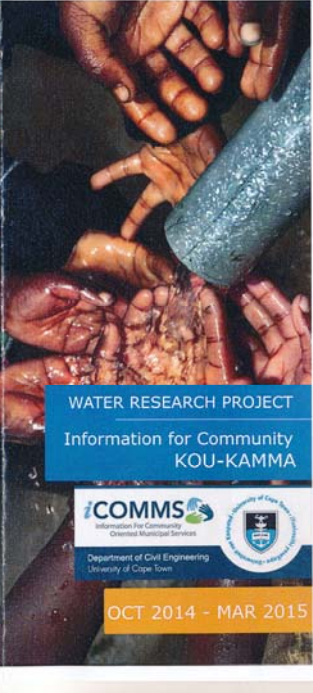
8.	Where do you get water when there are water shortages? Public tap River Dam Borehole Tanker No access Other…		
9.	Have you been involved in a sanitation project? If Yes, How? Planning Implementation Decision-making Construction Training/Education (On the use of the systems/Health and Hygiene practices)		
10.	Do ward committees and ward councillors inform you about any water and sanitation projects in the municipality?	Yes	No
11.	Have you heard of the Blue Drop and Green Drop reports for your municipality? If Yes, where did you hear about them? Have you seen them or read them?	Yes Yes	No No

Comments………
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Service Delivery			
1.	Is the water quality good?	Yes	No
2.	Is the water supply interrupted often? If Yes, how often?	Yes	No
3.	Are water issues attended to quickly?	Yes	No
4.	Do the waterborne sewerage systems work effectively?	Yes	No
5.	Are the sewer suction tanker services effective?	Yes	No

Comments:………
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Customer Relations		
1. Does the municipality involve you in their projects?	Yes	No
2. How does the municipality involve you in their projects? Is the involvement sufficient?	Yes	No
3. Does the municipality host public meetings to discuss problems in the community? If Yes, how often? Weekly Monthly Only when there are issues in the community Other…	Yes	No
4. Other than the ward councillors, who are the influential leaders in the community? (e.g. farmers, traditional leaders and business owners)		
5. Do you report any of your concerns to them?		
6. Do they speak to the municipality on your behalf?		
7. What is your view on how the municipality is doing its work? Where is it failing/succeeding?		
8. What do you like about your municipality?		
9. What don't you like about your municipality?		
10. What motivates you to report faults or interact with the community?		
11. Does the municipality inform you when there will be service interruptions? If Yes, how do they notify you?	Yes	No

Comments:……
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Generic Information		
1. What challenges do you face when reporting faults?		
2. Do you think being able to report a problem more easily will make a difference to your life? If Yes, how? If No, why not?	Yes	No
3. Do you think this project will help you engage with the municipality? If Yes, how? If No, why not? What are your concerns?	Yes	No
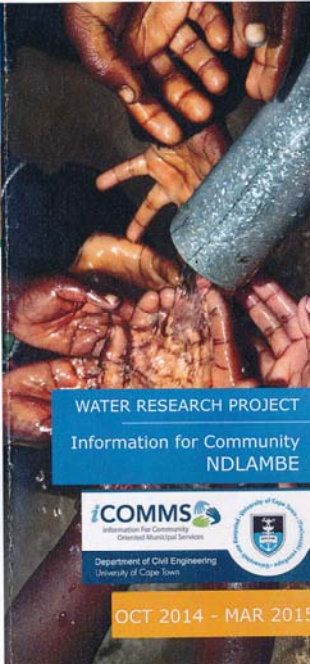
Comments:……
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Appendix D: Pamphlets for Community Information

Kou-Kamma pamphlet

Ndlambe pamphlet

WHAT TO DO

IF YOU HAVE A WATER AND SANITATION ISSUE PLEASE FOLLOW THE NEXT 4 STEPS

UKUBA UTHE WANENGXAKI ZONGQAMBUKO IOOPHAYIPHU BANGASESE NOFUNA UNCEDO IAMANZI ACOCELALEYO KUFANELE ULANDELE EZIMPAWU

AS JY ENIGE PROBLEME MET WATER EN SANITASIE HET VOLTOOI ASSEBLIEF DIE VOLGENDE 4 STAPPE

STEP 1 / ISIGABA 1 / STAP 1

DIAL

Send a "please call me" to this number * 060 671 1516 # or use the toll-free line number 0800 000 849

Nceda uthumele "please call me" kulenombolo * 060 671 1516 # . Okanye utsalele kule nombolo yamahala 0800 000 849

Stuur 'n "Please call me" na hierdie nommer * 060 671 1516 # of gebruik die "Toll free line" nommer 0800 000 849

STEP 3 / ISIGABA 3 / STAP 3

After the call you will receive a text with a reference number

Emva kokuba usitsalele umnxeba uzofumana inombolo eshiclielweyo (reference)

Jy sal na die oproep 'n SMS met 'n verwysings nommer ontvang

STEP 2 / ISIGABA 2 / STAP 2

If you send a please call me, you will receive a call in 24 hours. If you call the toll-free number you will speak directly to someone.

Emva kokuba uthumele u please call me uzopumana umnxeba oveia kuthi phambi kweeyure ezingamashumi amabini anesine. Ukuba uthe watsalele umnxeba wasimahla uzokuthetha nomnutu ngoko

As jy 'n "Please call me" stuur sal jy 'n oproep binne 24 uur terug kry. As jy 'n oproep na die "toll free line", sal jy direk met iemand praat.

STEP 4 / ISIGABA 4 / STAP 4

Your problem will be attended to

Ingxaki yakho izothathelwa ingqalelo emva kwexesha

Jou probleem sal hanteer word

STEP 5 / ISIGABA 5 / STAP 5

If your problem is not fixed in ten days, use the reference number to follow up with the Municipality (0800 000 849).

Uba ingxakiyakho khange isoujululwe kwintsuku ezilishumi uze weuze ulandelele usebeusize inombolo oyinkiweyo ngoku ubutsala umnxeba ukuxhumana nomasipala

Indien jou probleem nie binne 10 dae opgelos is nie, gebruik die verwysings nommer om met die munisipaliteit optevolg

NDLAMBE MUNICIPALITY

WATER RESEARCH COMMISSION

UNIVERSITY OF CAPE TOWN

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WATER RESEARCH PROJECT
Information for Community
NDLAMBE

iCOMMS
Information For Community
Oriented Municipal Services

Department of Civil Engineering
University of Cape Town

OCT 2014 - MAR 2015

Appendix E: ICT Design Questionnaire Pre-ICT Implementation Municipality

Module A: General ICT Information		
Do you have access to a computer at your workstation?	YES	NO
Do you have Internet access at your workstation?	YES	NO
If YES, rate the speed of Internet access at you work place?	1. Poor 2. Average 3. Good 4. Very Good	
If NO, how do you access Internet at work?		

Module B: System Access and Usage		
Before today's training, did you try using the ICT System?	YES	NO
If NO, kindly state a reason why you were not able to access and use the system		
If YES, were you able to enter some data into the ICT system?	YES	NO
If YES, how would you rate the ICT system in terms of ease of use?	1. Easy 2. Fairly easy 3. Complex 4. Very Complex	
Rate the speed of access to the ICT system	1. Very Slow 2. Slow 3. Average 4. Good 5. Very Good	
The system is currently hosted online; Would you recommend the system to be hosted at your municipality?	YES	NO
What challenges did you face using the system?		
Did you go through the ICT system user guide?	YES	NO
If NO, please state why you were not able to access the user guide		
If YES, was the user guide helpful?	YES	NO
If YES, how would you rate the user guide in terms of your ease to learn how to use the system	1. Very easy 2. Very Easy 3. Complex 4. Very complex	
Do you think the system will make a meaningful contribution?	YES	NO
If NO, state reasons		
If YES, state reasons	1. Decision-making 2. Data storage/ retrieval 3. Better reporting 4. Other...	

Module B: System Access and Usage		
Would you recommend the system to another municipality?	YES	NO
What additional changes would you suggest to the system?		
Would you recommend the system to be hosted here for faster access?		

Module C: Training Programme		
Was today's training on system usage helpful?	YES	NO
If NO, could you kindly state any reason?		
Would you that you state that you could learn to use the system without today's training?	YES	NO
If YES, how long would it take you to learn?	1. 30 Minutes 2. One Hour 3. Two Hours 4. One day	
How would you rate the training instructor?	5. Poor 6. Average 7. Good 8. Very good	

Anything else that is interesting or important that you would like to state?

Appendix E: ICT Design Questionnaire Pre-ICT Implementation Municipality

Module A: General ICT Information		
Do you have access to a computer at your workstation?	YES	NO
Do you have Internet access at your workstation?	YES	NO
If YES, rate the speed of Internet access at you work place?	5. Poor 6. Average 7. Good 8. Very Good	
If NO, how do you access Internet at work?		

Module B: System Access and Usage		
Before today's training, did you try using the ICT System?	YES	NO
If NO, kindly state a reason why you were not able to access and use the system		
If YES, were you able to enter some data into the ICT system?	YES	NO
If YES, how would you rate the ICT system in terms of ease of use?	5. Easy 6. Fairly easy 7. Complex 8. Very Complex	
Rate the speed of access to the ICT system	6. Very Slow 7. Slow 8. Average 9. Good 10. Very Good	
The system is currently hosted online; Would you recommend the system to be hosted at your municipality?	YES	NO
What challenges did you face using the system?		
Did you go through the ICT system user guide?	YES	NO
If NO, please state why you were not able to access the user guide		
If YES, was the user guide helpful?	YES	NO
If YES, how would you rate the user guide in terms of your ease to learn how to use the system	5. Very easy 6. Very Easy 7. Complex 8. Very complex	
Do you think the system will make a meaningful contribution?	YES	NO
If NO, state reasons		
If YES, state reasons	5. Decision-making 6. Data storage/ retrieval 7. Better reporting 8. Other...	

Module B: System Access and Usage		
Would you recommend the system to another municipality?	YES	NO
What additional changes would you suggest to the system?		
Would you recommend the system to be hosted here for faster access?		

Module C: Training Programme		
Was today's training on system usage helpful?	YES	NO
If NO, could you kindly state any reason?		
Would you that you state that you could learn to use the system without today's training?	YES	NO
If YES, how long would it take you to learn?	9. 30 Minutes 10. One Hour 11. Two Hours 12. One day	
How would you rate the training instructor?	13. Poor 14. Average 15. Good 16. Very good	

Anything else that is interesting or important that you would like to state?

Appendix F: ICT Evaluation Questionnaire – Municipality

Questions	Module A: User Experience		
1	Is the system user-friendly (Easy to use)?	YES	NO
2	If YES, how user-friendly is the system's interface?	1. Very user-friendly 2. Moderately user-friendly 3. Slightly user-friendly 4. Not at all user-friendly	
3	If NO, could you kindly state why?		
4	Does the system often fail (Stop working)?	YES	NO
5	If YES, how often does the system fail?	1. Very often 2. Moderately often 3. Very few times/ Very seldom 4. Not at all	
6	How successful is the system in performing its intended task?	1. Very successful 2. Moderately successful 3. Not successful at all	
7	Rate your speed of access and usage of the system	1. Very Good 2. Good 3. Average 4. Slow	
8	Does the system lead you to make any errors while you are working?	YES	NO
9	Are you able to correct the error?	YES	NO
10	Is the organisation of information in the system appropriate for you?	YES	NO
11	If NO, state reasons why.		
12	How would rate the system the system in terms of doing your job?	**(Select All that are Necessary)** 5. Has made it easier to do my job 6. Very useful in my job 7. Improved my job performance 8. Enhanced my effectiveness 9. Has not changed anything at all 10. Has made it harder to do my job	

Questions	Module B: User Satisfaction		
13	Does the system output the precise information you need?	YES	NO
14	IF NO, state why		
15	Is the output information presented in a useful format?	YES	NO
16	If NO, state why		

53

Questions	Module B: User Satisfaction		
17	Have you ever contacted iCOMMS for system service/ support?	YES	NO
18	If YES, in your most recent service experience, how did you contact the representative?	1. Email 2. By telephone 3. In person 4. Other……………………………	
19	How helpful was the support you received?	1. Very helpful 2. Moderately helpful 3. Not at all helpful	
20	How long did it take to get your problem resolved?	1. Immediately 2. Less than a day 3. Between 2 and 3 days 4. More than a week 5. The problem is still not resolved	
21	How many times did you have to contact the representative before the problem was corrected?	1. Once 2. Twice 3. Three times 4. More than three times	
22	Overall, how would you rate your satisfaction with the support services to the system?	1. Extremely satisfied 2. Somewhat satisfied 3. Neither satisfied nor dissatisfied 4. Somewhat dissatisfied 5. Extremely dissatisfied	
23	Overall, are you satisfied with the system in your work environment?	YES	NO
24	If YES, how satisfied were you with the system?	1. Very satisfied 2. Satisfied 3. Not satisfied 4. Unsure	
26	If NO, would you kindly state a reason why?		
26	How likely are you able to recommend the system?	1. Very likely 2. Likely 3. Unlikely 4. Not sure	

Suggest anything that we can do to improve the system:
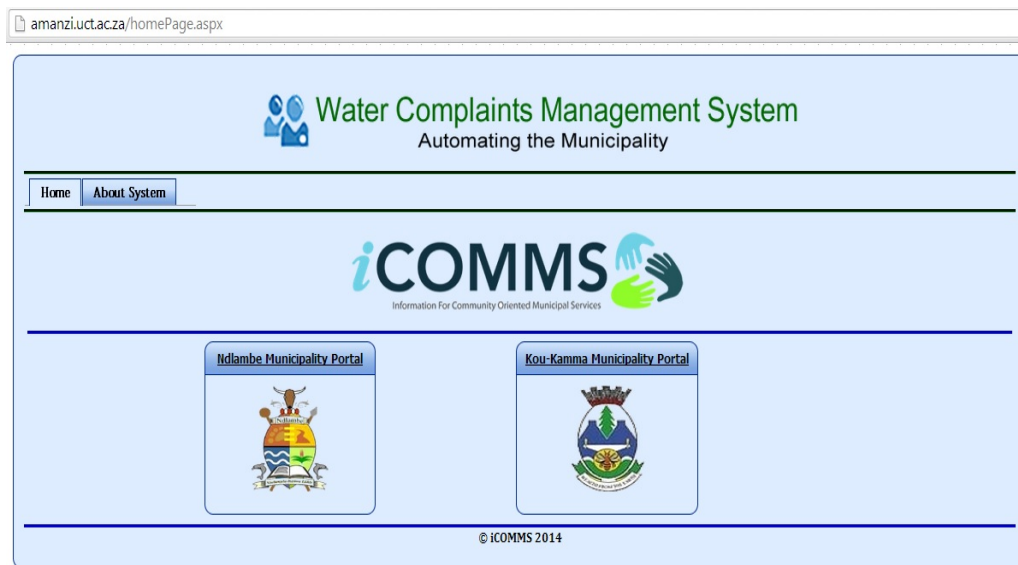
Figure 19: Municipality selection screen

Figure 20: Login screen

Figure 21: Enter complaints screen

Figure 22: All complaints screen

Figure 23: Complaint details

Figure 24: Example of report