



University of Fort Hare
Together in Excellence

Research Dissertation

A framework to guide development through ICT in rural areas in South Africa

By

Malungelo Siphiwosami Njinga Mamba

Student number: 201013549

Submitted in fulfilment of the requirements for the Degree

Master of Commerce: Information Systems

Faculty of Management and Commerce

University of Fort Hare

Supervisor: Ms Naomi Isabirye

Abstract

Information and Communication Technology (ICT) is widely regarded as a key tool for bringing about development to people who live in underserved areas. Technologies such as mobile phones and Wi-Fi are seen as advantageous because they can be made available to poor places without the cost of building extensive physical infrastructure. However, researchers argue that ICTs have failed to live up to their potential in the context of development. Researchers point out developing countries lack frameworks to guide them through the implementation of ICTs in this context. The objective of this study is to come up with a framework that can be used in rural areas in South Africa to implement ICT projects. The researcher interviewed individuals who have been directly involved in an ICT initiative in a rural setting in the Eastern Cape Province to learn from their experiences. The researcher also studied publications that have been produced from these initiatives in order to gain a richer understanding. The findings of the study show that participants share similar views about how ICT projects should be approached and implemented in rural areas in South Africa. The views are grouped according to similarity into themes and discussed in detail in the study. From these themes a framework that can help implement ICT projects in rural areas is developed.

Acknowledgements

I would like to thank the Lord God all mighty for life, strength and wisdom. I cannot express enough gratitude and appreciation for the guidance, wisdom, encouragement and tireless dedication of my supervisor Naomi Isabirye who went the extra mile to ensure that I complete this project. Thank you. I would like to express my love and appreciation for my mother who did not put me down after the mandatory nine months, but still carries me with love and joy to this day. Lastly, I would like to thank the Department of Information Systems, my colleagues and my friends.

Declaration of originality

I, Malungelo Siphiwosami Mamba hereby declare that:

- The work in this dissertation is my own work.
- All sources used or referred to have been documented and recognised.
- This dissertation has not previously been submitted in full or partial fulfilment of the requirements for an equivalent or higher qualification at any other recognised educational institution.

Signed_____

Malungelo Siphiwosami Mamba

Plagiarism declaration

I, Malungelo Siphiwosami Njinga Mamba student number 201013549 hereby declare that I am fully aware of the University of Fort Hare's policy on plagiarism and I have taken every precaution to comply with the regulations.

Signature:

Ethical compliance declaration:

I, Malungelo Siphiwosami Njinga Mamba student number 201013549 hereby declare that I am fully aware of the University of Fort Hare's policy on research ethics and I have taken every precaution to comply with the regulations. I have obtained an ethical clearance certificate from the University of Fort Hare's Research Ethics Committee and my reference number is the following: ISA01 ISMAM01

Signature:

Contents

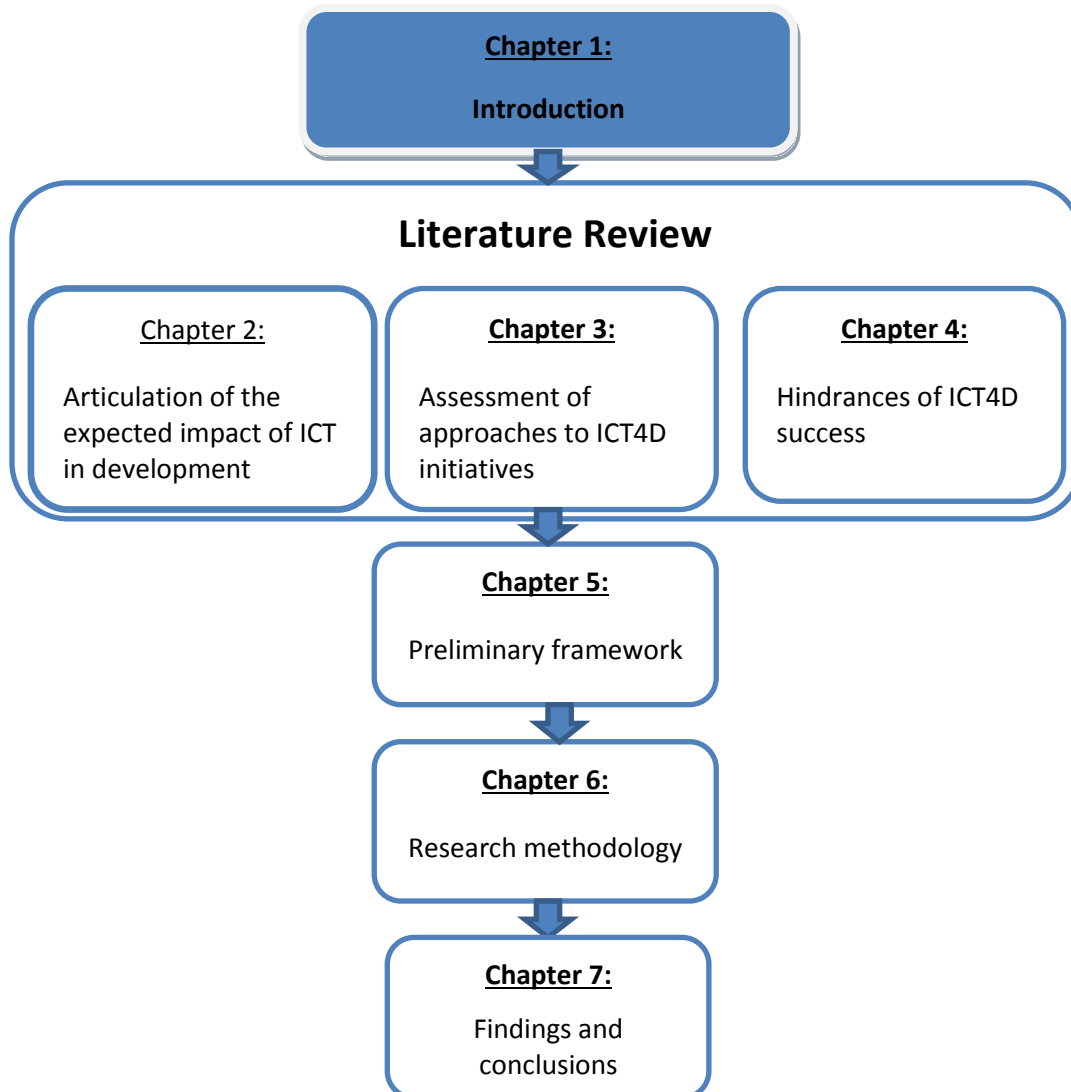
Abstract.....	2
1. Chapter 1: Introduction	1
1.1 Background	2
1.2 Statement of the problem	3
1.2.1 Reason for focusing on rural areas	4
1.3 Objectives of the study	4
1.4 Research questions	4
1.4.1 Main question	4
1.4.2 Sub-question 1: How can ICT interventions advance development?	4
1.4.3 Sub-question 2: How are ICT interventions currently undertaken?	5
1.4.4 Sub-question 3: What is hindering ICT4D from having the expected impact?	5
1.4.5 Sub-question 4: What needs to be done in terms of design and implementation of ICT4D initiatives in order to achieve the desired impact?	5
1.5 Significance of the study	5
1.6 Literature review.....	6
1.6.1 The role of ICT in development.....	6
1.6.2 How projects are currently undertaken.....	6
1.6.3 What is hindering ICT from making an impact?.....	7
1.7 Underlying theories.....	7
1.7.1 Diffusion of innovations theory	7
1.8 Research Methodology	8
1.8.1 Research paradigm	8
1.8.2 Research Design	9
1.8.3 Data Collection method	10
1.8.4 Data Analysis method	10
1.9 Delimitation of the Study	11
1.10 Ethical considerations	11
1.11 Chapter outline	11
2. Chapter 2: How can ICT interventions advance development?.....	13
2.1 Introduction	14
2.2 A history of ICT4D	14

2.3 A manifesto for ICT4D	17
2.4 Debunking ICT	20
2.5 Addressing the digital divide	24
2.6 The role of ICT in development	27
2.7 Conclusion	31
3. Chapter 3: How ICT4D interventions are currently undertaken	32
3.1 Introduction	33
3.2 RLabs in the Western Cape	34
3.3 E-Government in sub-Saharan Africa	37
3.4 E-Government in European Union cities	40
3.5 Telecentres in Tanzania	42
3.6 Closing the digital divide in rural America	44
3.7 ICT in Indian agriculture	46
3.8 The process approach	49
3.9 Implementation by ICT policy	56
3.10 Conclusion	57
4. Chapter 4: What is hindering ICT from making an impact?	59
4.1 Introduction	60
4.2 Symptoms and Causes of Failure	60
4.2.1 Poor policies	60
4.2.2 Hype	62
4.2.3 Ambiguity	65
4.2.4 ICT-development link	68
4.2.5 Lack of user participation	71
4.2.6 Ignoring local capacities	73
4.2.7 The wrong suspect	74
4.2.8 Lack of proper project management	75
4.3 Conclusion	75
5. Chapter 5: Preliminary framework	77
5.1 Introduction	78
5.2 Towards a conceptual framework for understanding developing countries	79
5.3 A dynamic framework to guide the implementation and evaluation of educational technologies	81
5.4 A framework for implementing ICT in agricultural development in India	83

5.5 Literature review from previous chapters	85
5.6 Explanation of framework	89
5.7 Conclusion.....	90
6. Chapter 6: Research methodology	91
6.1 Introduction	92
6.2 Research design	93
6.3 Research paradigm	93
6.4 Research questions	94
6.5 Problem statement	95
6.6 Underlying theories.....	95
6.6.1 Diffusion of Innovations Theory.....	95
6.7 Empirical study.....	96
6.8 Choosing a multiple case study.....	97
6.8.1 Construct validity	98
6.8.2 Internal validity	99
6.8.3 External validity.....	100
6.8.4 Reliability.....	101
6.9 Ethical considerations	103
6.11 Conclusion.....	103
Chapter 7: Findings and discussion.....	104
7.1 Introduction	105
7.2 Case description: Alice Regeneration Project	105
7.2.1 Alice Profile	105
7.3 Case description: Siyakhula Living Labs	109
7.3.1 Dwesa profile	109
7.4 Empirical data/findings	113
7.5 Analysis	120
7.5.1 Theme 1- Understanding community needs:	120
7.5.2 Theme 2- Appropriate technology:.....	121
7.5.2 Theme 3- Sustainability:.....	122
7.5.4 Theme 4- Project implementation:.....	123
7.6 Discussion.....	125
7.6.1 Community needs and perspectives.....	125
7.6.2 Appropriate technology	126

7.6.3 Planning for Sustainability	126
7.6.4 Maintaining community interest in the ICT infrastructure.....	127
7.6.5 Project management	128
7.6.6 Linking framework to development.....	130
8. Conclusion.....	130
8.1How framework links with sub-questions	131
8.2How can ICT interventions advance development?	131
8.3How are ICT interventions currently undertaken?	132
8.4What is hindering ICT4D from having the expected impact?	132
8.5 What needs to be done in terms of design and implementation of ICT4D initiatives in order to achieve the desired impact?	132
8.6Why this framework is plausible as a blueprint.....	133
8.7Why framework is applicable in different rural areas	133
9. References	135
10. Appendix A: Empirical data	141
 Figure 1: Continuum of Core Ontological Assumptions (Collins and Hussey, 2003).....	9
Figure 2: Preliminary framework	88
Figure 3: Research design	92
Figure 4: Continuum of Core Ontological Assumptions (Collins and Hussey, 2003).....	94
Figure 5:Technology Acceptance Model (Davies, 1989)	128
Figure 6: Refined framework	129

1. Chapter 1: Introduction



1.1 Background

In the year 2000, the United Nations (UN) published the Millennium Development Goals (MDGs) which, amongst others, aim to eradicate poverty across the world by the year 2015 (Wertlen, 2008). According to Wertlen (2008), the MDGs turned the focus to Information and Communication Technology (ICT) as a viable and important means of reaching out to marginalised communities. Harris and Rajora (2003) believe that ICT can help achieve some of the MDGs identified by the UN simultaneously. It is this spotlight on ICT in the context of development that has yielded a lot of interest and investment in the area that has become known as Information and Communication Technology for Development (ICT4D) over the past decade. Kamel, Rateb and El-Tawil (2009) point out that between 2002 and 2004, 500 global ICT organisations such as IBM, Microsoft, Siemens, Alcatel, Intel, and Oracle implemented over 1000 projects in developing countries. The investments in ICT4D indicate the level of expectations in the potential role of ICT as a catalyst for development.

The subject of development itself is contentious. There is no agreed upon definition or understanding of what development is. According to Thomas (2004) development is a complex and ambiguous topic. There are, however, three prominent notions of what development is. The first notion is discussed by Gore (2000). Gore begins with a notion of development that was popular in the 1950s and 1960s. In this notion, development is viewed as long term structural societal change. Thomas (2004) states that these are the kind of changes that inherently take place over the passage of time in every society. An example of such change that has taken place in most societies across the world is the move from the barter trade system to a money based capitalist system. Societies whereby the barter trade system perseveres would be considered to be backward or underdeveloped societies. Thomas (2004) highlights that in this kind of development discourse there are no particular sets of objectives, but rather societal changes that inevitably take place over a long period time.

Hickey and Mohan (2003) discuss the second notion of what development is. Contrary to inherent structural change, this second notion views development as planned changes that are beneficial to society or that are intended to advance society. Hickey and Mohan (2003) state that this is the understanding of development that is typically embraced by donor organisations and is embodied by the UN's MDGs. According to this notion of development there are presupposed characteristics that a society must possess for it to be considered a

developed society. Indicators of this discourse of development as suggested by Thomas (2004) include income levels, availability of infrastructure, state of technology, economic performance, empowerment, equality, environmental cleanliness, and social and political stability. Hickey and Mohan (2003) contend that this notion of development bases its success measures on what is assumed to be beneficial to a society.

The third notion of development is also discussed by Hickey and Mohan (2003). They point out that this is a post-modernist approach of the view of development. The post-modernist approach, according to Hickey and Mohan (2003), perceives development as the prominence of such things as spirituality and culture of a society. These are considered alternative value systems to the others discussed earlier. Chambers (2004) states that in our attempts to understand and articulate development we should consider our assertions and convictions as provisional and fallible. This study combines both the second and third notion; planned change for societal advancement, however not only focused on outcomes such as economic performance, but also recognises advancement in alternative value systems. Throughout this study development shall refer to this notion.

1.2 Statement of the problem

Literature shows that most ICT4D projects fail to achieve their goals in helping to advance development (Heeks, 2002). Bailur (2007) argues that this is not merely because of the lack of ICT infrastructure, as billions of US Dollars have been invested in infrastructure already with no success to show for. He argues that the problem lies with the method, or lack thereof in the implementation of ICT in development projects. Thomas (2004) concurs with this view by stating that there is lack of theoretical frameworks to link development with ICT. Although there are some frameworks for implementing ICT such as one cited by Gichoya (2006) as being used by the British government, the problem that this study addresses is that there is no framework that literature provides that is suitable to guide the introduction and use of ICT in South African rural areas.

1.2.1 Reason for focusing on rural areas

This study focuses on ICT4D initiatives in rural areas. The first reason for which this study focuses on rural areas is because of the challenges that rural communities face. Mtega and Malekani (2009) state that the majority of people in sub-Saharan Africa live in rural areas where there is rampant poverty and development is slow to take place. Chaudhuri (2012) believes that ICT has the potential to bring about rapid development in rural areas with minimum investment in physical infrastructure. This makes ICT an attractive prospect to study in the context of rural development. The decision to focus on rural areas is also that there are several ICT projects that are already running in rural areas in South Africa such as the Siyakhula Living Labs project in Mbashe Municipality in the Eastern Cape Province. This presents an opportunity to gain knowledge from experienced participants as well as from the documentation produced during the course of the projects. Focusing on rural areas is relevant and important because the success of ICT projects in this context is very low and therefore this area needs more investigation.

1.3 Objectives of the study

The objective of this study is to develop a framework that can be used to guide the implementation of ICT in rural development efforts so that the benefits of ICT can be realised.

1.4 Research questions

1.4.1 Main question

How can the design and implementation of rural ICT interventions be improved in order to achieve the desired objective of development?

1.4.2 Sub-question 1: How can ICT interventions advance development?

This question addresses the expected contributions or impact of ICT with regards to development. In this question, the study will look at the benefits that ICT can offer in any

aspect of development. Then it will focus on pointing out which of those benefits should be prioritised for rural communities in South Africa.

1.4.3 Sub-question 2: How are ICT interventions currently undertaken?

Harindranath and Sein (2007) state that the link between ICT and development is not clearly understood, and Thomas (2004) argues that there is no comprehensive framework to contextualise ICT in development. This question investigates the methods that have previously been used in the execution of ICT4D projects. Understanding this will help discover the real problems and ensure that the framework produced as an artefact of this study does not lead towards the repetition of mistakes.

1.4.4 Sub-question 3: What is hindering ICT4D from having the expected impact?

Answering this question requires an understanding of the needs of the target communities. Once those needs are understood, they are compared with the answer to sub-question 2 to find out if the manner in which ICT4D projects have previously been carried was sensitive to the target user's needs. Several other factors including infrastructure, costs and user abilities are taken into account.

1.4.5 Sub-question 4: What needs to be done in terms of design and implementation of ICT4D initiatives in order to achieve the desired impact?

The answers to this question are supposed to lead to a formulation of a solution that is informed by answers from the other sub-questions as well as the empirical study. This, in turn, should inform the development of the framework that is required by the main question.

1.5 Significance of the study

Heeks (2008) states that if people in disadvantaged areas had access to technology they would use it to empower themselves. This study is significant because it aims to contribute a solution that can enable ICT4D to be carried out in a manner that would enable community members to be able to make use of ICT to empower themselves. Akpan-Obong (2007) says

that the global mode of production is no longer industrial but informational. This highlights the significance of empowering communities with the ability and access to ICT.

1.6 Literature review

1.6.1 The role of ICT in development

Literature shows that ICT4D projects are normally targeted at underprivileged communities with the aim to provide or improve the opportunity for community members to achieve a livelihood. Wertlen (2008) recounts that in the year 2000 the UN set out what they termed the Millennium Development Goals (MDGs), an endeavour to bring acceptable levels of development across the world by the year 2015. In the UN's development strategy, ICT was identified as an important catalyst to the achievement of this goal. This highlights the magnitude of involvement expected of ICT in development. It is believed that robust pervasiveness and use of ICT can help speed up development. However, Heeks (2009) says there is evidence that the mere building of ICT infrastructure does not often lead to optimal use of ICT. He argues that most ICT4D initiatives fail completely to be adopted as an enabler to the daily activities of end users. Harindranath and Sein (2007) strongly argue that it is not exactly known how ICT is supposed to play its role. They argue that the problem lies in the failure to conceptualise ICT in the context of development. Heeks (2009) supports this argument by pointing out that ICT4D initiatives are usually commissioned by outsiders to the target communities. He argues that these are people who think in terms of the capability of the technology, but fail to implement the technology in a manner that may allow its capabilities to be aligned with the direction of development. In his working paper regarding ICT4D 2.0, Heeks (2009) states that the role of ICT needs to be reviewed, there needs to be new approaches to innovation and implementation, and there needs to be a new view of the world's poor.

1.6.2 How projects are currently undertaken

According to Heeks (2009), in the late 1990s development goals were new targets searching for delivery mechanisms while ICT were tools in search of a purpose. Heeks (2009) states that ICT was regarded as necessary for people to develop, therefore resulting in international

organisations initiating and sponsoring ICT initiatives in developing countries. Organisations such as the World Bank, IBM and Microsoft are known to have sponsored these projects (Kamel, Rateb and El-Tawil, 2009). Heeks (2009) explains that this has been the trend for ICT4D initiatives. Heeks argues that innovations therefore tend to come from outside the end user communities with little input from those communities as to their technology needs. Heeks (2009) also states that normally the ICT4D initiatives include either computer with Internet connectivity or telephone communication infrastructure. Lastly, Heeks (2009) states that the modus operandi is often the assumption or hope that members of the community would recognise the benefits of the new ICT infrastructure, find ways to use the technology for their benefit and maintain the infrastructure in good condition. Literature however, including Heeks' criticisms of ICT4D, shows that ICT4D initiatives do not often make the impact that is expected.

1.6.3 What is hindering ICT from making an impact?

Richard Heeks (2009) goes to great lengths to explain the reasons for which ICT4D initiatives tend to not achieve their goals. Heeks points out several problems that tend to hinder ICT from making an impact. He states that as most of these initiatives are in the form of donations, there normally is not a plan in place to sustain the projects once the donors are gone. Secondly, Heeks argues that it is costly to maintain ICT infrastructure and that this is often disregarded. Heeks also argues that the ICT initiatives are often not aligned either with the needs of the people, or the economic activities in the environment. He states that the problem is a condescending generalisation that people in developing areas are poor and they need technology to progress. He states that infrastructure such as telecentres are built yet the people are not educated as to how they can use the technology to add value to their lives, products and services. Another hindrance which is made prominent by Hameed (2006) is that there is a lack of understanding as to how ICT should be linked with development. He argues that development is not understood at all by project drivers.

1.7 Underlying theories

1.7.1 Diffusion of innovations theory

ICT for development initiatives are about diffusion of innovations. Singhal and Quinlan (2006) point out that when Apple launched the i-pod it was diffusing a product, or when a

campaign to raise awareness is being undertaken, diffusion is taking place. Roman (2004) defines diffusion of innovations theory as the social process of communication of a new idea among members of a community over time. He explains that this theory cuts across disciplines and different contexts and that it puts emphasis on the process of social change. Gouws and van Oudtshoorn (2011), states that there is so much interest in the diffusion of innovations theory because even when a new idea has obvious benefits, it is often difficult to get it adopted. This resonates with this study because on one hand authors such as Heeks (2009) express the potential benefit of ICT to underserved communities, and on the other hand authors such as Hameed (2006) express the difficulty of implementing ICTs as an intervention in development. This study therefore uses the theoretical lens of the diffusion of innovation theory to gain understanding as to how ICTs can be diffused in rural communities in South Africa in a manner that they are adopted and utilised.

Gouws and van Oudtshoorn (2011) point out that diffusion of innovations is fundamentally a communication process. They also point out that diffusion of innovations has since expanded beyond just communication to raise awareness, but also to cover decision making and implementation of the knowledge. Prescott (1995) writes about the diffusion of innovations theory in information technology research. She states that effective utilisation of ICT includes successful introduction and adoption, not merely communication of the ideas. She points out the importance of having champions for an ICT project in order to have it implemented successfully. It is the theoretical guidelines of the diffusion of innovations theory that influences this researcher in the manner in which the framework proposed in this study recommends with regards to the implementation of ICT for development project in South African rural areas.

1.8 Research Methodology

1.8.1 Research paradigm

According to Colling and Hussey (2003), researchers choose a paradigm with which to view reality. On one extreme is the positivist paradigm in which reality is viewed as a concrete structure whereby subjective perceptions have no influence on reality (Colling and Hussey, 2003). On the other extreme is the phenomenologist paradigm in which reality is viewed as a projection of human imagination. In other words, subject perception influences how reality is understood (Colling and Hussey, 2003). Collins and Hussey (2009) explain that researchers

seldom strictly conform to a specific paradigm, but tend to lean towards one extreme depending on the nature of their research. If the research is a quantitative one, the researcher would lean towards the positivist paradigm, however if it is qualitative the researcher would lean towards the phenomenologist paradigm. Colling and Hussey (2003) also point out that a research could combine qualitative and quantitative methods, in which case the researcher's views would account for a bit of both extremes. This study leans most towards the phenomenologist paradigm. It is a qualitative case study that employs semi structured interviews as a data collection tool. The resulting artefact of this research is a framework that can be applicable to other rural areas in South Africa besides the Eastern Cape where the study will be carried out. This study therefore will assume an understanding of reality as interpreted by the participants to whom the framework is supposed to be relevant and applicable.

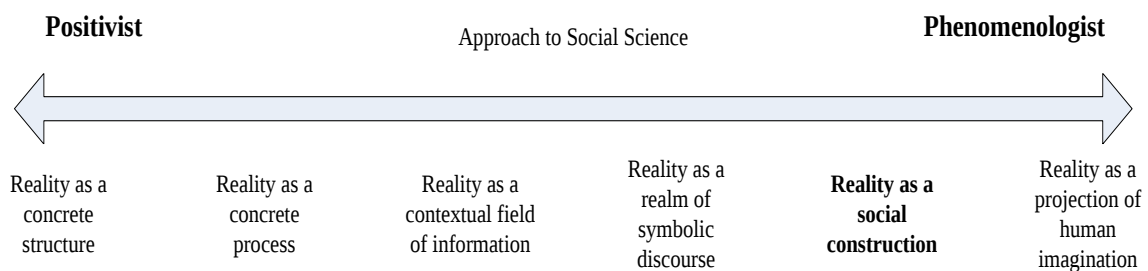


Figure 1: Continuum of Core Ontological Assumptions (Collins and Hussey, 2003)

1.8.2 Research Design

This study is designed as a case study. Yin (2003) states that when answering a “how” or “why” question, the case study method is desirable. Several other conditions associated with this research contribute to this choice. This study focuses on contemporary events such as an ICT4D project that is being implemented. The researcher also has no control of behavioural events. In accordance with Yin’s criteria for choosing a research design strategy, this study will utilise the case study strategy. Multiple cases in this study are going to be used because, as this is academic work, there is a need to demonstrate rigor and ensure credibility of the outcome. Yin (2003) states that case studies can be credibly generalised to theory when evidence is gathered from multiple cases as opposed to a single case. It is the goal of this research to produce a framework that can, to a greater extent, be generally applicable to most ICT4D projects.

The researcher will gather empirical data from two ICT4D projects. These will be the Alice Regeneration Project in Nkonkobe Municipality and the Siyakhula Living Labs Project in Dwesa. Each project will be considered a single case. The researcher will interview a sample of 4 people from each project. This means the researcher will interview a total sample of 8 people in both cases combined. According to Yin (2003), 8 in depth interviews are adequate to derive plausible conclusions.

1.8.3 Data Collection method

According to Yin (2003), there are six main sources of evidence that may be appropriate to use for the case study research strategy. They are archival records, documentation, direct observation, participant observation, interviews and physical artefacts. Yin (2003) points out that when conducting case study research, it is not encouraged to gather all evidence from a single source. The evidence gathered by a researcher is more credible and valid if it is corroborated and augmented with evidence from other sources. Yin (2003) therefore motivates that case study researchers should gather evidence from multiple sources of evidence. The researcher will also collect secondary data from other publications and reports relating to these projects.

With regards to the collection of primary data, this study will employ the interviewing technique. The researcher will use a semi structured interview technique with open ended questions. According to Bryman (2004), semi structured interviews provide guidance to the interviewer to ensure that important questions are not left out while at the same time giving enough leeway to the interviewee to divert when explaining their point of view. Allowing the interviewee to explain themselves freely will ensure that the researcher understands the interviewee's point of view and context of explanation as much as possible. The semi structured interview also allows the interviewer to ask follow up questions where further clarity could be obtained.

1.8.4 Data Analysis method

This study will employ the cross case analysis technique to analyse evidence. Yin (2003), states that the cross case analysis method is suitable for analysing multiple cases. Yin (2003) points out that by using this method, analysing multiple cases is likely to be easier and the

findings are likely to be more robust. According to Yin (2003), the cross case analysis method involves finding patterns in individual cases by using a uniform framework. He states that the examination of patterns rely on argumentative interpretation. This conforms to the interpretive paradigm assumed by this study as well as the in-depth data that will be collected using the semi-structured interview method. The patterns identified in individual cases are then compared to those from other cases to find similarities and differences in all the cases being examined. If rival explanations have been addressed, all evidence considered, and the most significant aspects of the case studies addressed, then the output of the study will be of high quality (Yin, 2003).

1.9 Delimitation of the Study

Peri-urban areas will not be included in this study. Even though it may be argued that in many ways peri-urban areas may face similar challenges as rural areas and may also be target of development initiatives, they are outside the scope of this research project. This study focuses on ICT4D initiatives in rural areas in the Eastern Cape.

1.10 Ethical considerations

This study is compliant with the ethical regulations stipulated by the University of Fort Hare's Research Ethics Committee. This study includes carrying out interviews. Therefore there are ethical considerations with regards to participants' willingness to take part, privacy, and confidentiality. The ethical standards that are upheld in this study are detailed in chapter 6, the research methodology chapter.

1.11 Chapter outline

Chapter 1: This is the research proposal. This chapter identifies and explains the problem and proposes the research method that will be followed to provide some answers as well as the resultant artefact.

Chapter 2: Articulates the roles that ICT can play in development and explains how to identify them.

Chapter3: Examines some projects to determine how they are implemented. The purpose of this chapter is to expose the researcher to more knowledge about the implementation of ICT4D project.

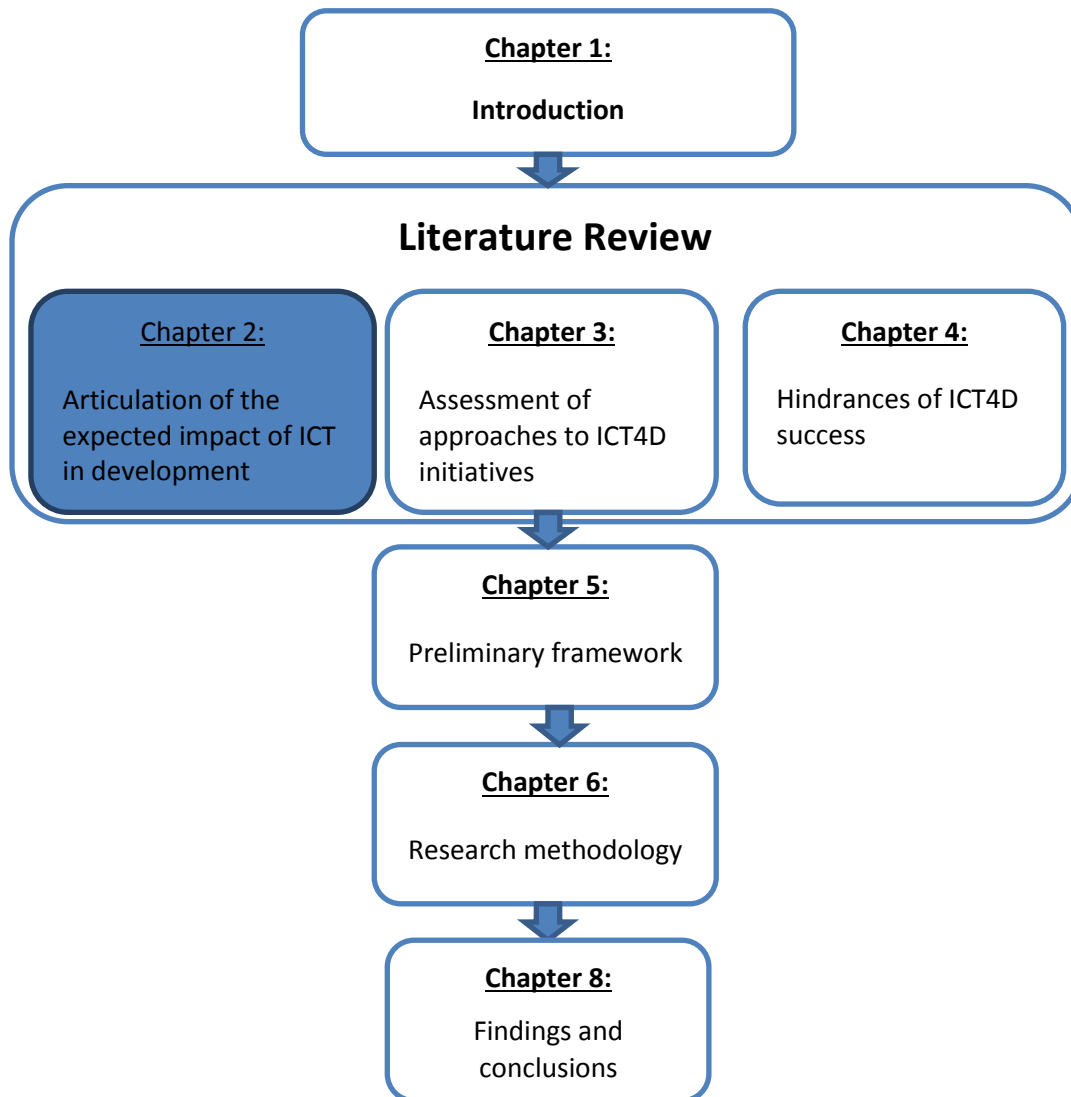
Chapter 4: This investigates the causes of failure in ICT4D. It studies problems that have been identified by authors in other publications. The purpose of this chapter is to raise awareness as to the pitfalls that appear during project implementation so that the research may account for them or devise a plan to mitigate them.

Chapter 5: In this chapter, the researcher examines all the information collected in the literature review of the previous chapter in a holistic manner. The researcher uses the knowledge acquired from these to design a framework that can help implement ICT4D projects in the context of South African rural areas. It must be noted that this framework is a preliminary one. The final framework that is produced by this study as the contribution is a refinement of the preliminary framework. The refinements are informed by empirical evidence.

Chapter 6: This is the research design chapter. Here the researcher explains how the study is carried out. The researcher articulates how population sample is selected and how data is collected analysed.

Chapter 7: This is the chapter in which the researcher makes a contribution. Here, the refined framework is produced. The researcher discusses the findings and the framework and draws conclusions.

2. Chapter 2: How can ICT interventions advance development?



2.1 Introduction

This chapter studies the role that information and communication technology (ICT) can play in development. It begins with a brief history of the computer. The computer is singled out because literature shows that it is the development of the computer that ultimately led to the study of information and communication technology for development (ICT4D). In the study of ICT4D, it is believed that ICT has the potential to uplift underdeveloped countries and help their citizens out of poverty. This notion needs to be qualified because there is a lack of evidence to demonstrate the manner in which ICT can be an enabler in rural development. There is scepticism regarding the relevance of ICT in development among some researchers. Attention is also paid not just to defining ICT4D, but also to pointing out specific technologies that are actually utilised in ICT4D.

Furthermore, this chapter briefly discusses the notion of ‘digital divide’. It is felt that by outlining the relevance of ICT in development, the notion of digital divide also has to be discussed because it is closely related to this subject. In the closing sub-section of this chapter, the study defines the role that ICT is expected to play in development. This is accomplished by using the information that is collected from ICT4D literature and presented during the course of the chapter. The ICT roles that are defined in this chapter are not exhaustive, but merely roles that can be identified and easily explained within the limitations of the scope of this literature review. The history of the computer is first presented to guide the reader to understand how ICT4D came about.

2.2 A history of ICT4D

The history of ICT4D can be traced back to the development of the first mainframe computer. The first computer to use the stored program architecture was the Manchester Small Scale Experimental Machine (SSEM), also known as the Manchester Baby in 1949 in the University of Manchester (Bazovkina, 2011; BBC, 1997). Stored program architecture means that the machine was programmable. Bazovkina (2011) states that nearly all modern computers implement some form of stored program architecture. According to Bazovkina (2011), the Manchester Baby consisted mainly of valves and wires and displayed information on a cathode-ray tube. The history of computers shows that they were mostly developed for

purposes of carrying out arithmetic calculations, and Bazovkina reveals that the word computer was first recorded in 1613 to refer to a person who carried out calculations.

Heeks (2008) says that the first computer to be installed in a developing country was installed in Kolkata, India in 1956. This computer was installed at the Indian Institute of Statistics to carry out arithmetic calculations. According to the BBC (1997), the microchip emerged in the 1960s and revolutionised computers into smaller machines but with shorter processing time, meaning they became smaller but faster. The ability to make computers small in size made possible the idea of individual ownership. Jon Agar, a professor from the University of Cambridge featured in a 1997 BBC documentary states that prior to the micro-chip, “the idea of having a computer in the home was like having a chemical engineering plant in the home” (Agar, 1997). Before the computer was considered an important business tool, it was more popular with computer hobbyists who mostly programmed games (BBC, 1997). Even though computers had become more pervasive amongst teenagers in the early 1980s, no big companies recognised that there could be a demand for a type of computer that can be used in business (BBC, 1997).

This changed when IBM noticed the growing demand for the small computer market and subsequently developed a small computer which was named the Personal Computer (PC) (BBC, 1997). The BBC (1997) reveals that IBM marketed the PC primarily for office use. Apple computers improved the user friendliness of computers by introducing icons. In the meantime, Microsoft Corporation introduced programs such as word processor which proved useful for business use (BBC, 1997). With these developments, using a computer became an efficient way to perform functional business tasks such as word processing, data capture and data storage. Weber and Toyama (2010) state that for a long time computer usage in developing countries was primarily restricted to academia and governmental organisations. Heeks (2008) states that due to the usability of computers and the multitude of tasks that they could perform; they were adopted as internal administrative tools by governments in both developing and developed countries. Heeks calls this information and communication for government (ICT4G) and states that it was during this era that the acronym IT (Information Technology) came to be synonymous with computer technology.

The introduction of the TCP/IP in 1984 and World Wide Web (www) system in 1989 as well as the commoditisation of digital technologies led to the take-off of the Internet in the 1990s (Weber and Toyama, 2010). Writing for The New York Times about the history of Internet

protocols, Stephen Crocker states that when they were developing networking protocols they used to mail printouts of notes to other research groups (The New York Times, 2009). This embodies the dissemination of written communication before the Internet. In the advent of the Internet, computers were no longer limited to functional tasks in the organisation. They gained rapid popularity as communication technology. To put this into perspective, Hutter (1999) states that in the US fewer than 1000 businesses had websites in 1990. By the end of 1995, Hutter states that over 15000 businesses had websites. According to Zhao (2008) in China Internet usage went from 620 thousand users in 1997 to 162 million in 2007. Heeks (2008) reveals that ICT became regarded as the tool for competitive advantage and growth in the private sector.

Around the mid-1990s, Weber and Toyama (2010) state that multinational technology companies started to view emerging markets as a new business frontier. For example, Intel initiated several product development activities in China and India, and Microsoft set up what was termed an Unlimited Potential Group in order to engage emerging markets (Weber and Toyama, 2010). It is this successful application of ICT in commercial domains as well as the general availability of the Internet in developed countries that Heeks (2008) believes invigorated the interest as to what can be achieved with ICT in developing countries other than the prior use in academia and government. When Heeks (2008) tackles the question of why ICT is considered a delivery mechanism for development, he argues that in the future the economic, political and social livelihood of people increasingly require digital interaction with digital technologies.

Heeks (2008) then states that the pervasiveness of the Internet and the United Nations' (UN) Millennium Development Goals (MDGs) are the two things that gave birth to drive to apply ICT in development, also known as ICT for development (ICT4D). He argues that ICT as a delivery mechanism for development was given a bona fide status by the UN upon the declaration of the MDGs. Heeks (2008) states that in the mid-1990s as the Internet became a household name. International development was also subject of international political agenda. It was here in 1996 that what was then called the International Development Goals, was formalised by the UN in 2000 as the MGDs, that the rhetoric of ICT4D was born (Heeks, 2008).

2.3 A manifesto for ICT4D

An argument to qualify the idea that ICT indeed can be an effective delivery mechanism for development is important because there is scepticism in the field of ICT4D research. Some authors argue that there is lack of evidence to support the notion that ICT does enable or even accelerate development. According to Soriano (2007) the credibility of ICT as a mechanism of delivery for development is questioned by many authors involved in ICT4D research. According to Soriano, some authors argue that funds would be better spent on traditional forms of development instead of trying to involve ICT. Heeks (2008), although a proponent of ICT4D, sums up his thoughts about its lack of success by writing that “ICT4D is the rusting tractors of the 21st century”. The problem with ICT4D is that there is lack of concrete evidence that it is a good delivery mechanism for development as earlier believed when the UN endorsed it during the pronouncement of MDGs. Heeks (2009), states that from the onset, ICTs were new tools in search of purpose, suggesting that development was subsequently identified as the purpose in the wake of the MDGs. Weber and Toyama (2010) state that the rhetoric about the link between ICT and development is not founded on good evidence. For instance, they point out that research has repeatedly failed to provide reliable evidence of the impact of telecentres in rural communities in developing countries despite being the most attempted form of ICT4D intervention. Van Reijswoud (2009) also casts a shadow of doubt over ICT4D’s relevance to development by stating that success stories of ICT4D are difficult to find. Such a negative outlook begs the question as to where do the belief that ICT4D has an important role to play in development comes from?

The argument for the continuation of ICT4D interventions is influenced by perceived future needs as opposed to past trials and failures. When Heeks (2009) tackles the question of why ICT is considered a delivery mechanism for development, he argues that future economic, political and social livelihood will become increasingly dependent on ICT. Wertlen (2008) also suggests that in the future, modes of production will increasingly be informational and thus increasingly require access to ICT. Despite the disappointing track record of ICT4D, there is a strong conviction that populations who will be deprived of access to ICT will face difficulty in the future (Heeks, 2009), (Hameed, 2006), (Wertlen, 2008) and (Harindranath and Sein, 2007). The UN expressed this in stronger terms stating “Although the costs of using ICTs to build national information infrastructures which can contribute to innovative knowledge societies are high, the costs of not doing so are likely to be much higher” (Zhao,

2008). Zhao (2008) points out that the United Nations Development Program (UNDP), World Bank, and the International Telecommunication Union (ITU) continue to encourage developing countries to investment in their national ICT infrastructures. The statements by these authors paint a picture which shows that ICT will become central to daily human life in the future. The observed past failures of ICT4D mean that more research and funding has to be put into the implementation of ICT in development. Heeks (2009) states that new technologies are required, new approaches to innovation and implementation, new intellectual perspectives, as well as a new view of developing countries. Heeks essentially admits that ICT4D has so far been a failure, but also believes that changes to the approach to ICT4D implementation need to be made instead of abandoning the whole idea of applying ICT as a delivery mechanism of development.

To strengthen the argument for ICT4D it is necessary to demonstrate that ICT is indeed becoming an important aspect of human life by providing some evidence. Zhao's (2008) arguments allude to saying it is logical and obvious that humans will increasingly depend on ICT based on the developments of the past two decades, while Heeks (2009) on the other hand calls for changes without demonstrating that they will make the desirable impact. To support the argument that ICT can be applied successfully, three examples where ICT has been used to achieve developmental goals are provided as evidence. These examples involve New Zealand, South Africa, Swaziland and Rwanda. For New Zealand (NZ), the impact of ICT is studied from an economic point of view. Engelbrecht and Xayavong (2005) study the impact of ICT on labour productivity (LP) growth by comparing LP growth in more ICT intensive industries to that of less ICT intensive industries between 1993 and 2003. Firstly they point out that NZ's growth has been among the slowest in its region for the past twenty years. This essentially means NZ's productivity growth has been relatively weak. However, their study reveals that even under those prevailing conditions, LP growth in more ICT intensive industries improved relative to those in less ICT intensive industries (Engelbrecht and Xayavong, 2005). Engelbrecht and Xayavong's study provides evidence that applying ICT does bring about an advantage compared to not applying ICT.

Heeks (2009) poses the question "Why invest in digital technologies rather than, say, a tube-well to allow access to water?" Heeks' question seeks to elicit a reason which will justify the involvement of ICT in a developmental project such as a tube-well. Rossouw, Botha and Dlamini (2005) provide such a response. Rossouw et al. (2005) review the Water Quality

Information Management System (WQIMS) that is used by the Komati Water Basin Authority (KOBWA) to manage water in the Komati River basin between South Africa and Swaziland. Rossouw et al. (2005) provide two reasons for which this information system is necessary. First they note that water resource management is complex and requires sophisticated tools. Secondly, there are disparate levels of sophistication in water management between neighbouring countries, and this project does span between two countries whose levels technological advancement are not at the same. Prior to the collaboration, the Swaziland Ministry of Natural Resources and Energy had been using spreadsheet to compile data on water quality of rivers in their territory while the South African Department of Water Affairs and Forestry had been using a more sophisticated Hydrological Information System in their territory (Rossouw et al., 2005). Rossouw et al. (2005) do not hide the fact that the WQIMS needs improvement in its design; however, emphasis is put on the fact that the WQIMS is indispensable for management of rivers and dams in the basin and is successful in enabling flawless collaboration between the two countries. This account by Rossouw et al. provides a good example of successful application of ICT in a developmental initiative. Their review highlights not only the successful application of ICT, but also the necessity of ICT.

The third example to be used to illustrate the necessity of ICT in development is TRACNet in Rwanda. TRAC is an acronym for Treatment and Research Aids Centre. It is an IT system for collecting, storing and disseminating HIV/AIDS related information (UN, 2008). In a 2008 case study publication by the UN, it is stated that TRACNet has been a success since it was implemented incrementally from 2004. By 2007, TRACNet was covering 168 health facilities across Rwanda that offer ARV therapy which catered to 43 000 ARV patients. According to the case study, TRACNet has enabled doctors in rural areas to instantaneously access information such as blood tests results from laboratories that are mostly located in the capital Kigali, enabled authorities to monitor the stocks of ARV drugs in real time and also to monitor indicators and outbreaks across the country. The adoption of the system by patients is stimulated by the availability of toll free numbers provided by Rwanda Tel and MTN-Rwanda and that TRACNet is available to solar energy chargeable mobile phones that can access an easy to use Interactive Voice Response (IVR) technology (UN, 2008). The study does not state whether the technology has helped decrease the spread of HIV/AIDS in Rwanda, but it emphasises that the system has enabled authorities to be aware of the scale of the problem and that issues regarding lack of information to medical practitioners and ARV

shortages have been solved through the use of TRACNet. In other words, even though the system cannot be said to help decrease the prevalence of HIV/AIDS, it is enabling authorities to manage the prevailing circumstances. This is an example of an ICT4D initiative that is successfully fulfilling its purpose.

These examples support the argument for the necessity and potential of ICT in development. However, an answer has to be provided to the question posed in this chapter which begs for a more explicit specification of the role that ICT is expected to play in development. Before the role that ICT is expected to play in development can be specified with any level of accuracy, it is important to establish an understanding of exactly what is meant by ICT. The following sub-section focuses on the specifics of the ICT itself.

2.4 Debunking ICT

Information and communication technology (ICT) is defined by Njoh (2011) as devices and systems that enable collection, processing, storing, transfer and exchange of information. Mtega and Malekani (2009) list some examples of ICTs as radio, television, telephone, fax machine, computer, software, notice boards, books, brochures, posters, newspapers, the Internet, audio cassettes and video cassettes. According to Osterwalder (2002), ICT has become a catchword with different interpretations even among experts. He states that ‘in principle’ ICT has been in existence since the advent of the printing press. Njoh (2011) concurs with Osterwalder, stating that technologies such as radio, television and fixed telephones are often ignored technologies in ICT4D initiatives in favour of sophisticated technologies such as computers, mobile phones and the Internet. This point raised by Njoh requires more attention for two reasons. The first reason is that the history of ICT4D, as provided in the opening sub-section of this chapter, shows that computers and computer driven technologies such as the Internet and associated software were the reason ICT was associated with development; hence Heeks (2009) says that the new ICTs in the 1990s were tools waiting for a purpose. The second reason is that closer examination of ICT4D literature reveals that indeed focus tends to be on what Njoh calls sophisticated technologies such as Internet infrastructure. Ignoring the specifics of what constitutes ICT in ICT4D creates a problem that Van Reijswoud (2009) calls a ‘one size fits all notion of ICT’.

Van Reijswoud (2009) argues that there are several reasons for which attention must be paid with regards the precise types of ICT in question. These include the skills that will be needed

to solve technical problems, the costs of maintaining infrastructure and the fit of technology to the role it has to play. The purpose of this chapter is to identify the role that ICT needs to play in development. Therefore the issues that are raised by Van Reijswoud (2009); Osterwalder (2002); and Njoh (2011) are valid. To investigate the types of ICT often used in development, several ICT4D initiatives are analysed to determine and point out the technologies that were employed. These are the Siyakhula Living Labs (SLL) initiative in Mbashe Municipality, the Reconstructed LivingLabs (RLabs) initiative in Cape Town, and a Telecentre initiative.

Siyakhula Living Lab (SLL) is an ICT4D initiative that is situated in Mbashe Municipality in the Eastern Cape and covers several rural areas within this municipality. Ranga, Thinyane and Terzoli (2011) explain that schools are often the chosen location for ICT initiatives in rural areas because they are believed to be the central point of contact for people, are fairly secure and in other cases are the only places with electricity. Pade-Khene, Palmer and Kavhai (2010) provide two main objectives of the SLL. The first objective is to provide a multifunctional communication platform. This means the communication platform would serve both to provide technological support for other development projects as well as to provide information to the community. The second objective is to equip people with technical skills with regards, for instance, to e-commerce activities. The focus in this section however is on the specific type of technologies that are installed in the SLL initiative. According to Ranga et al. (2011) the technologies employed in the SLL include VSAT (Very Small Aperture Terminal), WiMAX (World Wide Interoperability for Microwave Access) network, a web server, computers (a computer lab), database, router and VoIP phone. This is mostly equipment for Internet access. WiMAX refers to 4th Generation (4G) technologies that allow for fixed and mobile broadband access (Twele and Thinyane, 2011). The Internet can be accessed in the computer labs or wirelessly on Wi-Fi hotspots with a 100 metre radius of the school (Twele and Thinyane, 2011). The literature shows that the ICTs employed in the SLL initiatives are sophisticated, modern digital technologies.

The Reconstructed Living Lab (RLab) initiative is an ICT4D initiative that is situated in Athlone, a district located in the Cape Flats region in Cape Town. This initiative was started by community members and it enjoys a partnership with academia, business and government (Parker, Wills and Wills, 2012). According to Parker et al. (2012) this initiative was founded by community members with the purpose of improving life choices of other people's lives. They state that the RLabs aim to increase empowerment and development of people through

creation, dissemination and application of knowledge. Services that the initiative now provides include drug advice support, debt counselling, HIV/AIDS helpline, some courses as well as employment (Parker et al. 2012). Mobile phone technology is central to the success of this initiative. Parker et al. (2012) reveals that the R Labs developed a mobile instant messenger aggregator that be used to manage multiple mobile chat conversations. Instant messaging is possible through the use of 3rd Generation (3G) enabled technologies, for instance 3G enabled mobile phones. 3G technologies allow for real time communication between users such as sending text messages, pictures, videos as well as voice messages. This example shows that digital technologies are preferred in this initiative for their ability to allow constant interaction between users as opposed to opting for a community radio for example, which would render other users passive participants.

Telecentres are a popular type of ICT4D initiative in rural areas. Mtega and Malekani (2009) state that by the year 2000 there were over 9000 telecentres across Africa in countries including Tanzania, Mali, Senegal and Benin. Telecentres are also popular initiatives in India and are increasingly regarded as important (Rao, 2008). Rao (2008) defines telecentres as community gathering places where people can access communication technology and applications, and learn new skills. Mtega and Malekani (2009) state that telecentres have one major objective, which is to enhance information accessibility. However, at this point, this section is interested in investigating specific technologies that are typically used in telecentre initiatives regardless of the objective. Mtega and Malekani (2009) provide a table that specifies the types and quantity of technologies they found in four rural telecentres in Tanzania. This table is shown as Table 1 below.

Table 1: technologies found in telecenters in Tanzania

No table of figures entries found.	Kilosa	Mpwapwa	Kasulu	Karagwe
Computer	10	72	41	4
Fax machine	1	1	1	1
Photocopier	1	1	1	1
Printer	1	1	1	1
Radio and accessories	1	-	-	1
Satellite dish	1	1	1	1
Landline phone	1	1	1	1

Television set	1	1	1	-
Scanner	1	1	1	1

Table 1: Types of technologies in Tanzania telecentres (Mtega and Malekani, 2009)

Based on the information observed in Table 2, it can be argued that the computer is the main piece of technology that is deployed in telecentres in Tanzania. The information in this table is also consistent with Njoh's (2011) assertion that radio and television are ignored in ICT initiatives when it comes to actual implementation.

Furthermore, Rao (2009) discusses some technology options for telecentres in India. Rao mentions cellular phones, (WiFi), WiMax and VSATs. It can pointed out that most of the technologies that feature in Mtega and Malekani's list of examples of ICTs such as Newspapers, radio, television and notice boards are not present within the framework of telecentres when it comes to implementation.

A closer look at the technology that is employed in ICT4D initiatives reveals that one of the main objectives of ICT4D is to provide Internet access. The infrastructure that is set up as demonstrated by the case studies above is one that is designed to allow communities to access the Internet. The Internet indeed is an important development tool to possess. According to Rao (2009) the Internet is both the market place as well as the medium to access other market places. This view can also be corroborated by taking into consideration that the ITU measures ICT penetration by the level of Internet usage. For instance, the ITU (2009) graded Sweden, Australia and USA as countries with the most ICT penetration based on Internet access statistics. In the South African Department of Communication report about ICT progress in 2009, greater emphasis is placed on issues relating to broadband. It is important to point out that Internet access is not being portrayed as the only key service pursued through ICT4D initiatives. Other services that stand out include IT skills development and entrepreneurship. For example, in all the cases studied by Mtega and Malekani (2009), teaching computer literacy to community members is one of the goals in all the telecentres. This simple analysis demonstrates that ICT4D initiatives aim to fulfil multiple needs.

Having looked closely at the technology, the following sub-section tackles the topic of the digital divide. It is the view of this researcher that the issue of ICT in development settings can be approached from the point of view of 'ICT4D' or from the point of view of 'bridging the digital divide'. This is explained in detail below, however as a synopsis, this author

believes that the 'ICT4D' approach puts development first and treats ICT as a tool whereas the 'digital divide approach puts ICT first and treats development as an inherent outcome.

2.5 Addressing the digital divide

While discussing the technologies used in ICT4D, one topic that needs to be addressed is that of the digital divide. Rao (2009) provides a few definitions of digital divide to try and capture its meaning. One of the definitions provided by Rao states that digital divide is the gap that exists between those who have and those who do not have access to technology. Another definition states that it is the gap in opportunities experienced by those with limited access to technology (Rao, 2009). These definitions are complimentary to each other as access to technology is expected to avail development opportunities. It is evident that the idea of bridging the digital divide is consistent with the philosophy and goals of ICT4D.

Careful consideration must however be taken when approaching the topics of digital divide and ICT4D. Although the focus for both philosophies is essentially development, there appears to be a difference in their outlook. ICT4D is more development centred with technology regarded as a vehicle, whereas the digital divide approach is more techno-centric with development regarded as an inherent consequence of the availability of digital technology. To qualify this statement, one may start by reading the work of Richard Heeks. Heeks (2008) states that prior to the rhetoric of ICT4D, the UN already did have a development agenda. Heeks states that on one hand there were development goals and on the other there were new technologies in need of purpose. Heeks believes that it was the successful application of ICT in the commercial domain in developed countries that got the world imagining as to what ICT can help achieve in developing countries. In a 2008 publication, Heeks argues that that it was the pervasiveness of the Internet as well as the development ambitions of the UN that gave birth to ICT4D. In fact, in the list of the eight MDGs, none prescribes ICT. ICT is considered as a tool that can facilitate the achievement of the MDGs.

In contrast, the approach of the digital divide philosophy suggests that the lack of ICT is the central problem. It is presumed that the absence of ICT itself is the catalyst to the problems of societies that are lagging behind in ICT use. The fears of an increasing digital divide are clear. Rao (2009) observes that India is worried that the widening digital divide in its society is fuelling the challenges faced by underprivileged communities. Sipior, Ward, Volonino and

Marzec (2004) write “the divide cannot be expected to continue without adverse consequences to society and its economy”. It is evident that from the point of view of ICT4D, the goal is to use ICT as much as possible to foster whatever development endeavour whereas from the point of view of bridging the digital divide, the goal is to have ICT in as many places as possible with the expectation that this will result in development opportunities.

A dichotomy between these two approaches is seen as important in this study because of the problems that may arise if the slight differences are overlooked. Van Reijswoud (2009) decries the approach to ICT4D that he calls “dump-and-run”. This is an approach whereby technology such as computers is made available to communities without taking into consideration how it will be beneficial or even sustainable. This approach, Van Reijswoud (2009) notes, does not take into account the developmental needs and necessary customization of technology in order to fit the environment. Emphasis is put on bringing about technology. Van Reijswoud is not an opponent of the idea of bridging the digital divide. He is actually a supporter of it hence he proposes improved methods of going about it. However, the connection that Van Reijswoud makes between ICT4D and digital divide raises an issue. Van Reijswoud (2009) writes that ICT4D is based on the premise that ICT is able to bridge the digital divide between the developed and developing countries and thereby contribute to equal distribution of wealth.

The association between the ICT4D and digital divide that Van Reijswoud is making is problematic because it is not all developmental problems that need to be preceded by availability of ICT in order to improve people’s lives. For instance, in South Africa some pressing problems for people in under developed areas include lack of housing, lack of clean water and unemployment. The benefits of ICT such as access to computers, printers or information weigh less under such circumstances as opposed to putting available resources to construction of houses and water systems. Even a small clinic may be more beneficial to a poor community than a telecentre. In contrast to this view, an ICT4D approach would be, for example, to bring about the development being a small community clinic. However, if possible, ICT would be used to help run and manage the clinic to improve its efficiency. The primary goal in this example is not to bridge a digital divide per se, but it is to tap into the efficiency afforded by ICT as much as possible where it is viable.

A reference may again be made to the MDGs. Take for instance one of the goals which is to combat HIV/AIDS, Malaria and other diseases. Achieving this goal need not be high-tech. Making HIV/AIDS education part of the curriculum in schools, encouraging condom use in polygamous marriages, getting rid of stagnant pools of water and fumigation with DDT may to a large extent achieve this goal. However, as demonstrated by the use of TRACNet in Rwanda, the use of ICT can help make the process very efficient and effective. Looking at this assertion gives a partial answer to the main question in this section, which seeks to explore the role that ICT needs to play in development. The analysis made here shows that ICT is to be an enabler to whatever development endeavour is being pursued. Sipior et al. (2004) writes about a community that implemented a computer training program, which they state was a great achievement for the community. They state the program was effective in that participants learned computer skills. However, it is not clear how the participants would take advantage of knowing how to use a computer. This shows the problem that comes with simply 'bridging the digital divide'.

In the previous sub section attention was paid to the specific types of technology that are often implemented in ICT4D initiatives. While on the discussion of a digital divide, a closer look at the technology is also worth revisiting. The phrase 'digital divide' itself is suggestive as to the kind of technology that is being used. It suggests that digital technology is the specific technology that is sought in order close the information gap. Wikipedia defines digital technology as technology that uses digits, or binary numerical values to represent information. Some examples of digital technologies are computers, mp3 players, hard drives and compact discs. Sipior et al. (2004) points out that Internet access is viewed as the key to narrowing the divide. It must be understood there are non-digital technologies that may be more important to the development of communities such as wind turbines or solar panels to deliver electricity and water purifiers to deliver clean water. However, while still on the topic of digital technology, the important point that is being made here is that the computer and Internet are the main technologies that are sought after.

Arguments on digital divide show that ICT is predominantly viewed in light of economic development and not much in light of other domains of development. In reference to bridging the digital divide, Van Reijswoud states that the ultimate goal is that everyone should have access to computers and information everywhere and always. The outcome of this, as Van Reijswoud suggests, would be a path towards equal distribution of wealth. Parker (2000) believes that rural communities that are not connected to broadband network

will suffer the same economic fate as those communities that were bypassed by the telephone network, railroad or interstate highway. Indeed these fears may be well founded, as Rao (2009) points out that Singapore for example announced that it will not trade with any business that cannot transact with it using electronic data interchange (EDI) over a computer network.

Digital divide philosophy posits that the absence of technology is the problem. However, the problem is the absence of resources and services that may be efficiently delivered if ICT is used. Community protests are seldom over the lack of information, but people protest because of lack of clean water, good roads, housing, energy and safety.

2.6 The role of ICT in development

In the study of ICT4D, the obvious goal is development. This is despite the fact that development is often not clearly defined. For the purposes of this study, a definition of development was settled upon in order to make observations and arguments easier. In a previous sub-section, this study discussed the topic of ICT in order to produce a picture of some of the exact technologies that are employed in ICT4D initiatives. This is important because the continuous use of the umbrella term 'ICT' inhibits awareness and sensitivity of the complexity of the actual technology that is introduced in communities. In a similar fashion, the aim in this sub-section is to specify some of the developments, or rather goals that would have to be achieved so we may be able to assess the level of development that has been reached within communities. In the previous chapter, it was stated that for the purpose of this study development shall be defined as planned changes that are beneficial to society and are intended to advance society (Hickey and Mohan, 2003). This is not the only definition or discourse of development. Hickey and Mohan (2003) confirm that this definition of development is consistent with the UN's development philosophy expressed through the MDGs.

In this literature review, consideration is taken to ensure that every sub-section is relevant to the question which this chapter seeks to answer. Therefore, it is worth explaining that zooming in on some of the actual goals that need to be achieved in the pursuit of development will help us get a step further to identifying the role that ICT can play. South Africa is a member state of the UN and a signatory to the eight development goals set by the UN for its developing members (MDG South African Report, 2010). The MDGs are

therefore some examples of development goals which South Africa is pursuing. The MDGs by numerical order are as follows members (MDG South African Report, 2010):

1. To eradicate extreme poverty and hunger
2. To achieve universal primary education
3. To promote gender equality and empower women
4. To reduce child mortality
5. To improve maternal health
6. To combat HIV/AIDS, malaria and other diseases
7. To ensure environmental sustainability
8. To develop a global partnership for development

In the MDG South African report of 2010, a table is provided to show how South Africa has created a link between its national development planning and the MDGs in order to ensure that the MDGs are relevant to the needs of South Africans. Table 2 below shows that link.

Table 2: Linking SA development strategies with MDGs

Linkage between South Africa's national development planning and the MDGs		
STRATEGIC ELEMENTS		RELEVANT MDGS
1.	Strategic Priority 1: Speeding up growth and transforming the economy to create decent work and sustainable livelihoods	MDG 1, MDG 2, MDG 3, MDG 8
2.	Strategic Priority 2: Massive programme to build economic and social infrastructure	MDG 1, MDG 3, MDG 8
3.	Strategic Priority 3: Comprehensive rural development strategy linked to land and agrarian reform and food security	MDG 1, MDG 2, MDG 7
4.	Strategic Priority 4: Strengthen the skills and human resource base	MDG 2
5.	Strategic Priority 5: Improve the health profile of all South Africans	MDG 4, MDG 5, MDG 6
6.	Strategic Priority 6: Intensify the fight against crime	MDG 2, MDG 3

	and corruption	
7.	Strategic Priority 7: Build cohesive, caring and sustainable communities	MDG 2, MDG 3, MDG 7
8.	Strategic Priority 8: Pursuing African advancement and enhanced international cooperation	MDG 8
9.	Strategic Priority 9: Sustainable resource management and use	MDG 2, MDG 3, MDG 7
10	Strategic Priority 10: Building a developmental state, including improvement of public services and strengthening democratic institutions	MDG 1, MDG 2, MDG 3, MDG 8

Table 2: UN MDGs and SA Development Goals (MDG SA Report, 2010)

Table 2 shows that each of the ten strategic development priorities that South Africa has set often has a bearing on more than one MDG. It can be noted that each of the strategic priorities mostly fulfil the corresponding MDGs partially. That is, strategic priority number one for example may not necessarily fulfil MDG 3 (Gender equality and women empowerment) even if its goal is achieved. To South Africa's credit, MDG 3 appears relevant in several other strategic development priorities which show the country's commitment to ensuring that women are empowered. Strategic priority number 1 may be interpreted to say that the aim is to reduce poverty, make universal education available, promote gender equality and women empowerment and develop partnerships through fast paced economic growth and transformation and job creation. ICT4D proponents would argue that with such a goal set, which appears to have nothing to do with ICT, ICT can be used as a delivery mechanism.

Heeks (2008) provides a guideline to help identify the role that ICT can play in this endeavour. Heeks proposes that these three questions can be asked:

1. What is possible with technology (relates to the capabilities of the technology)
2. What is feasible with technology (relates to requirements and design)
3. What is desirable with technology (relates to developmental outcomes)

This is a suggested approach by Heeks. It remains a difficult task to clearly identify the role that ICT is to play in development initiatives because there are no established guidelines or theoretical frameworks to help link development and ICT (Hameed, 2007; Harindranath and Sein (2007); and Thomas (2004)). .

ICT is supposed to play a multi-dimensional role. By looking at both the MDGs and the South African Strategic Plans, it can be observed that the development goals vary from economic, health, social as well as education. These are the dimensions that ICT must play a relevant and effective role in with regards to development.

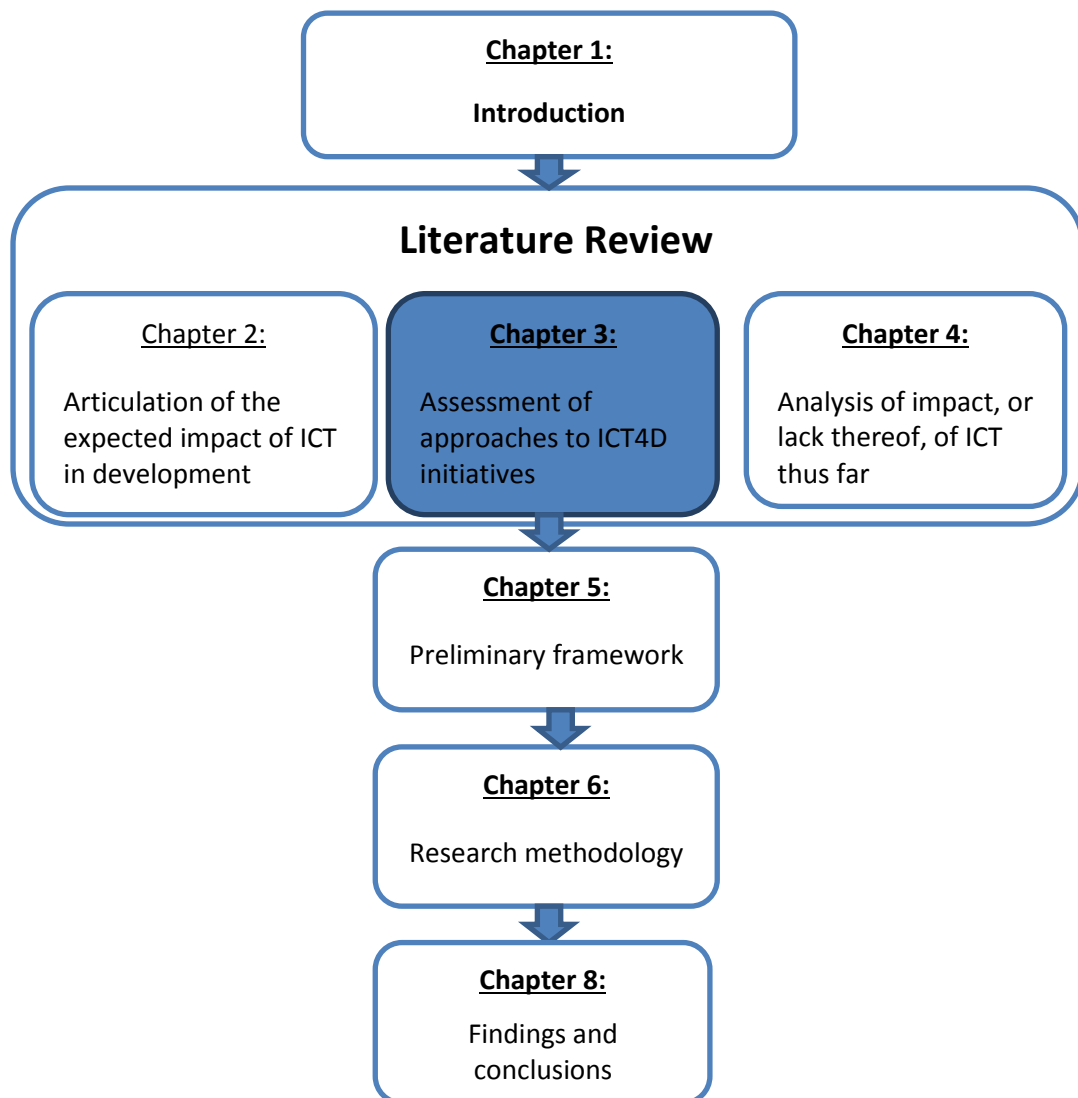
According to Leonardo-Barton (1992) ICT can enhance development as well as inhibit development. She argues that if innovation is introduced in an institutionalised manner it may lead to incumbent inertia. Walton and Heeks (2009) argue against an approach to ICT4D that they call the 'top-down' approach. They state that in this kind of approach, ICT4D project initiators who typically come from outside the communities which they seek to develop, come with pre-conceived ideas of what technologies communities need and how they ought to be introduced and implemented. This is a kind of structured, or institutionalised approach that is criticised widely in ICT4D literature as a main factor for the failure of ICT4D initiatives. It is argued that such an approach create a design reality gap, which is a situation whereby the technology does not meet the needs of the community. In this situation it can be argued that the introduction of technology becomes a hindrance to development in that resources that have been spent on the technology could have been spent on other less sophisticated project such as irrigation.

Leonardo-Barton (1992) also talks about the negative psychological impact that the introduction of technology can have on users in the context of unmet expectations. She points out that the promise of technology raises expectations of empowerment. Indeed ICT is heralded as technology that is capable of delivering rapid development, thus empowering poor populations even in remote rural areas in developing countries. Chaudhuri (2012) states that there is no evidence to support that ICT4D does deliver what its proponents claim it can deliver. He points that as a result, the hype around ICT4D creates false expectations. Under such circumstances, the arrival of technology with exaggerated claims may lead to disillusionment and loss of confidence in developmental interventions. This is the negative psychological impact that Leonardo-Barton refers to as a result of technology failing to meet its needs.

2.7 Conclusion

This chapter shows the progression from the development of the computer to its use of as a development tool. The study in this chapter, through the use of literature, substantiates the view that ICT has an important role to play in development. The relevance of ICT in development is therefore an acceptable premise. It is also revealed through a table that the South African National Development Strategy is in harmony with the UN's MDGs. The study shows that ICT has indeed achieved limited success in developing countries, giving confidence that if applied properly the benefits can be immense. The study in this section also opens up the term 'ICT' to reveal what is really being referred to with this term. Mtega and Malekani (2009) reveal that most ICT4D initiatives revolve around the personal computer as the primary ICT. The digital divide is also discussed in this section. The study shows that viewing ICT4D from a digital divide perspective may not be the best approach. This is because it has been shown that literature suggests that the digital divide perspective focuses mainly on the presence and access to technology. It ignores the social aspects that are key to having technology relevant to the users, accepted and adopted. In other words, the digital divide perspective is criticised as being too techno-centric.

3. Chapter 3: How ICT4D interventions are currently undertaken?



3.1 Introduction

In chapter 2, this study explored the necessity of ICT in development. It accepts the view that indeed ICT does have an important role to play in development. Chapter 2 focuses on how ICT came to be associated with development as well as found justifications for its association. In this chapter, the study examines how ICT is introduced and implemented in development initiatives. The goal of this chapter is to bring about a detailed understanding of the implementation process of ICT in a developmental context. It was pointed out in the previous chapter that ICT is an important tool for competitiveness and success in the business environment. It was also pointed out that authors in the field of ICT for development (ICT4D) believe that the application of ICT has been found to be more successful in developed countries than in developing countries. It is accepted in ICT4D literature that ICT has predominantly not been a success in developing countries, therefore, cases of ICT4D in developing countries and in developed countries will be discussed in this chapter to interrogate the manner or method in which ICT have been implemented in those case. Cases where authors propose a different implementation method will be presented and discussed.

It must be emphasised that no conclusions are reached in this chapter with regards to the success or potential success of an implementation method. There is no method that is endorsed as the correct method or model for ICT4D. The goal of this chapter is to investigate and reveal from ICT4D literature how ICT4D has been implemented in several cases. Cases from different countries that also differ in levels of development and culture are used in this study in order to improve the validity of the analysis and provide points of reference for each case to another.

It is hoped that by understanding how ICT4D initiatives are undertaken, we will be able to discover their true goals, mistakes, and successes where there are any. As much as it is widely accepted that ICT4D has not been successful in the past, it would be unscientific to criticize or try to fix a process that is less understood in the first place. This chapter seeks to shed some light and understanding as to how ICT4D has actually been undertaken in the past.

3.2 RLabs in the Western Cape

Parker, Wills and Wills (2012) provide some information about the RLabs in the Western Cape. Their aim is to give a South African perspective on community driven ICT4D initiative. It is duly noted that the Living Lab concept has been used in other parts of the world. A breakdown of how the RLabs initiative unfolded in the Western Cape is the primary interest of this analysis. Parker et al. (2012) provide a background of the community where this initiative started in order to set the context. This initiative took place in the Athlone, a Cape Town district in the Western Cape. They reveal that Athlone is an area affected by social deprivation, violence, drugs and gang activity. On July 10th the online newspaper news24 reported that Western Cape Premier Helen Zille sent a letter to South Africa President Jacob Zuma requesting that the army be deployed to the Cape Flats to combat gang violence (<http://www.news24.com/SouthAfrica/Politics/Zille-politicising-gang-violence-20120710>, 2012). On August 2nd, the newspaper reported that the government agreed to deploy the military (<http://www.news24.com/SouthAfrica/News/Army-to-be-deployed-to-gang-hit-areas-20120802>, 2012). This highlights the scale of socio-economic problems that the people of the Cape Flats as a whole are facing.

The RLabs initiative was spearheaded by former gangsters and drug addicts in Athlone (Parker et al, 2012). Their motive was to use their past experiences to help improve the kinds of choices that people in their community make to improve their lives. According to Parker et al (2012), the first step the group took was to approach and the non-governmental organisation (NGO) called Impact Direct Ministries (IDM). Parker et al (2012) notes that this group did not reflect a sample of the whole community, but rather was just a small group who could relate to a widespread community problem and wanted to champion change. The group, together with IDM, started collaborating with the Cape Peninsula University of Technology (CPUT) and further established links with the government as well as other academic stakeholders such as the University of Southampton Parker et al, (2012). At this stage it is clear that the community, through this small group, were the initiators and primary stakeholders of this initiative. It is clear what their hopes and goals were for starting this initiative. It is also clear how the other stakeholders got into the picture and got involved with this particular community.

The next thing that this analysis attempts to understand is how the drive to bring change to a community by a group of community members evolved into Living Lab framework and how

ICT became central to the accomplishment of the goals of this initiative. Parker et al (2012) says that the collaboration between the stakeholders of the initiative yielded the RLab approach. According to Parker et al (2012) an RLab is a Living Lab. They use a definition of Living Labs provided by Core Labs (2008) which states that a Living Lab is a functional region where stakeholders collaborate to create, prototype, validate and test new services, products and in systems in real life contexts (Parker et al, 2012). From this definition it can be seen that the RLab is therefore a place where the community members of Athlone together with the other stakeholders could outline problem in their community and work together on incrementally developing and deploying solutions. Parker et al (2012) points out that it is an interactive environment where changes to solution approach reflect the changing needs of the community. This answers the question of how the Living Lab model was adopted.

The question remains of how technology came to be considered central to achieving the aspirations of this initiative. For a start, it can be said that the answer lies with the intentions of the group from the community that spearheaded the initiative. The vision was to use their experiences to help provide the community with information that could help them make different choices. From this it can be deduced that information sharing is the main output of this initiative. Parker et al (2012) states that the aim was to empower and encourage the community through creation, dissemination and application of knowledge. This is an area in which ICT is indispensable. The specific ICT that was found to be more appropriate in this initiative were mobile phones. The first reason is the prevalence of mobile phones in South African society. Parker et al (2012) provide some figures which show that by 2008 mobile phone subscription in South Africa was 45 million compared to a fixed land line subscription of 4.4 million. Mobile phones have more advantages, such as portability, mobility, affordability to purchase and maintain (Parker et al, 2012), instant messaging, real time communication, and Internet access ability. Some mobile phones also have the ability to provide services that are normally provided by other ICTs such as radio access. Individual ownership of mobile phones means people can access information from where they are as opposed to having to travel to a local telecentre.

The RLab initiative provides services that can be delivered on mobile phone technology. According to Parker et al (2012) an actual technology innovation that came out of the RLab as its product was an instant mobile messenger platform that can manage multiple chat rooms simultaneously. They state that the initiative continues to provide space for innovation of

new products. Several services are provided through this initiative. These are stated by Parker et al (2012) as; drug advice support, debt counselling, HIV/AIDS counselling, training, text job advertisement, and digital marketing. This case provided by Parker et al (2012) shows a good analysis of how an ICT4D initiative was undertaken. From this case we learnt that the RLabs initiative was an idea that originated from within the community. The problem that the initiative is trying to mitigate is well understood. The reason for the involvement of ICT and its role is easy to identify. The output of the initiative with regards to its initial goal is also easy to relate. What is also worth noting with this initiative is that it is not regarded a project. It is regarded as an on-going initiative that has the prospect to grow. Parker et al (2012) does point out that since the inception of the initiative in 2007, some community members have already been trained and are practicing consultants. This demonstrated the skills development that has been accomplished.

When it comes to the role of mobile phones in development, the views expressed by authors are the same as those that are expressed about ICT4D in general. That, there is no evidence to support the effective role of mobile phones in development, however, there is a lot of confidence and theoretical notions of how much mobile phones can help advance development in poor areas of developing countries. Rashid and Elder (2009) point out that as much as mobile phones are the most dominant mode of communication in developing countries, there is still no evidence of usage of mobile phones as a tool for development. They explain that studies that explore the usage of mobile phones in developing countries are far and few between. One may use Prensky's (2004) observation that mobile phones are generally less thought of as computers yet, as he points out, mobile phones now have more computing power than desktop computers of the mid-1990s.

It is noteworthy that Rashid and Elder (2009) are not pouring cold water on the potential role of mobile phones in development. They point out that mobile phones require less physical infrastructure because they use radio spectrum, they point out that mobile phones require basic literacy to understand and operate as opposed to desktop computers, they also point out that mobile phones are increasingly affordable to the lower strata of society in developing countries. Although there is lack of empirical evidence mobile phones have enhanced development, Acker and Mbiti (2010) provide examples of situations where mobile phones have contributed positively to the lives of people in developing countries. They present the following cases: "In Mali, residents of Timbuktu are able to call relatives living in the capital

city of Bamako or relatives in France. In Ghana, farmers in Tamale are able to send a text message to learn corn and tomato prices in Accra, over 1,000 kilometers away. In Niger, day laborers are able to call acquaintances in Benin to find out about job opportunities without making the US\$40 trip. In Malawi, those affected by HIV and AIDS can receive text messages daily, reminding them to take their medicines on schedule. Citizens in countries as diverse as Kenya, Nigeria and Mozambique are able to report violent confrontations via text message to a centralized server that is viewable, in real time, by the entire world.”

Prensky (2004) poses a rhetorical question as to what can we benefit from the use of mobile phones. He answers the question stating “anything, if we design it right”. The cases presented by Acker and Mbiti (2010) provide theoretical evidence that if mobile phones are used correctly there can be a lot that people in developing countries can benefit from them in the context of development. The case of the RLabs, as already described, shows that how the community stands to benefit from the use of mobile phones. The description of the case shows the advantages of using mobile phones in this initiative as opposed to other forms of ICTs.

3.3 E-Government in sub-Saharan Africa

E-government is supported by donor organisations such as the World Bank as a particularly important area of ICT4D (Schuppan, 2009). E-Government stands for electronic government. It refers to the use of electronic means to provide government services. Electronics in such cases normally refer to ICTs, and Schuppan explains that ICT in these cases is often understood to mean the Internet and Internet based technologies. There are a number of benefits that developing countries can gain from proper application of ICT in government processes. One of the most important areas that Schuppan (2009) highlight as problematic in developing countries, particularly sub-Saharan countries is public administration. Schuppan points out that e-government itself originates from public administration of developed countries and that e-government has been relatively successful in those countries. However, Schuppan states it strongly that public administration in most sub-Saharan countries is inefficient and ineffective to the extent that implementation of political will is barely possible. Schuppan believes that e-government can contribute to solving

administrative problems provided the unique environment in each particular country is taken into account.

Other benefits that Schuppan believes are possible with e-government is reduced corruption, efficient provision of public services, statistical information processing, finance management and tax systems, and public participation which would boost the democracy profile of a country. Schuppan (2009) decried the lack of data in relation to e-government progress in sub-Saharan Africa. Even then, Schuppan states that it is without doubt that countries in sub-Saharan Africa are underdeveloped when it comes to progress in e-government, with the exception of South Africa. With this said, Schuppan points out that there are few cases where e-government initiatives have been undertaken by several sub-Saharan countries. This section of this study is more concerned about how these initiatives were undertaken in these countries, however few as they may be. The aim is to analyse the method or process in which ICT4D initiatives were executed. Schuppan looks at e-government initiatives in Ghana and Tanzania, which this study analyses.

In the case of Ghana, the Ghanaian government wanted to make Ghana's ports important transit centres for goods in West Africa. The problem was that getting clearance for goods required a long process in which transporters personally had to go to 25 to 32 different offices just to get all the paperwork that permit goods to go through. The Ghanaian government realised that the use of ICT can help solve this problem. The Minister of Trade and Industry at the time spearheaded the development of an ICT system that could allow for efficiency at the ports by forming a venture with the Bank Ghana, Customs and Excise Preventive Service (CEPS), Ghanaian shipping council and other shipping companies (Schuppan, 2009). According to Schuppan (2009) a broadband network was created to enable communication between the ICT system that was under development and CEPS. The outcome of this initiative was the Ghana Community Network (GCNet). The GCNet has two components (Schuppan, 2009). The first component is called TradeNet and is a system for information exchange on trade between organisations concerned. The second component is the customs management system which automates the issue of custom declarations and management of import and export licences (Schuppan, 2009).

This case study on the Ghanaian e-government initiative reveals some information as how the project was implemented. It is revealed that the idea originated from the government. The aims and goals of the government are clear in that they wanted the port to grow in important

in the region and aimed to accomplish this by improving the efficiency of the port. The reason for which ICT got to be involved in this process which falls within the scope of government responsibilities is also easy to identify. The government understood that the inefficiencies were a result of long process that is needed to get clearance for goods and have all relevant stakeholder furnished with relevant information pertaining to transactions. This is a process that could be standardised and automated to an extent with the use of ICT. Processing of documents could then be done electronically and information transmitted on the data exchange platform provided by ICT. This is another case whereby it is not difficult to relate the aim to the outcome, and it is also a project that had an end date and roll out phase, albeit delays due to political reasons and slow user acceptance.

Schuppan (2009) also provides a case study for a Tanzanian e-government initiative. The problem that the Tanzanian government faced was that they were failing to increase tax income as well as efficiency using their current methods in the 1990s (Schuppan, 2009). The government therefore came up with the idea to build an electronic tax system that would achieve these goals. They wanted a system that would make it easy for citizens to file taxes and for the government to detect any irregularities. The implementation of an ICT solution was therefore a logical step. Schuppan provides a clear step by step account of how this particular project was undertaken. In the first phase, administration was furnished with computers, project employees were trained, a business analysis was undertaken and software was designed (Schuppan, 2009). In the second phase the software was programmed while at the same time the system was rolled out in relevant regions of the country (Schuppan, 2009). Full implementation was finally completed in June 2007 (Schuppan, 2009). Schuppan also states that in order to maintain and upgrade the system, four working groups were created to provide continual support, maintenance and modification of the system where necessary.

This is a straight forward case with regards to how the project was undertaken. It is clear that the idea originated from the Tanzanian government with the aim of improve efficiency in tax collection in order to improve service provision to people and to increase their revenues. The phases from analyses to implementation are laid out by Schuppan. Providing this service indeed is within the scope of government making this a good example of an e-government case. The aim to keep the system sustainable is seen through the establishment of four teams whose purpose is to maintain and upgrade the system. This is also a good example of a project in that the lifecycle from the start to implementation is shown.

3.4 E-Government in European Union cities

Torres, Pina and Acerete (2005) provide an article that discusses the usage of public e-services to citizens in European cities. This study analyses this article in order to draw a contrast between e-government in Europe and Schuppan's view of e-government in sub-Saharan Africa. Torres et al (2005) does not provide information on how e-government initiatives are undertaken, but does provide information that reveals the administrative attitudes in Europe as well as ICT prevalence among citizens. Schuppan (2009) identifies some of the administration issues in sub-Saharan Africa to be power struggles and cultural factors in addition to poor training and corruption. Power struggles and cultural factors are important factors because Schuppan believes that it determines administrative attitude towards change. Torres et al (2005) suggest that the shift of paradigm within Europe from bureaucratic system to a flexible service delivery system is achievable with much less political will than would be required in sub-Saharan countries. Some of the causes of unwillingness to change by sub-Saharan leaders may be colonial legacy, restrictions imposed by international donors as well as cultural norms that manifest themselves in different value systems (Schuppan, 2009).

On the European case, Torres et al. (2005) reveal that to public managers the shift from producer concerns such as cost-efficiency to focusing on client satisfaction and flexibility through electronic means was a logical administrative step towards service delivery. What this information reveals is not the difference in the method in which e-government is implemented in Europe in comparison to Africa, but the ease at which e-government can be driven by European public administrators as opposed to sub-Saharan public administrators. With regards to the technology itself, there is something that one may point out in terms of slight differences between these two regions. Schuppan (2009) made a statement asserting that e-government up-take in sub-Saharan Africa is extremely poor with exception to South Africa. On that note, Schuppan pointed out that there are however rare cases where sub-Saharan leaders have turned to ICT. Schuppan provided case studies about GCNet in Ghana and ITAX in Tanzania. It is worth noting that although these are among the few cases that Schuppan could salvage, they are sophisticated ICT solutions that provide specific and limited services. In these particular cases, one would have to be shipping goods as in the case of Ghana or paying tax as in the case of Tanzania in order to experience the benefits of e-government. It must be emphasised that this is not stated in a negative manner. The aim is

to draw a contrast between these cases and the cases of European cities provided by Torres et al (2005).

When talking about e-government in Europe, Torres et al uses an example of broad service delivery as opposed to limited functionalities. Torres et al at all gives an account of European scenarios in which citizens in cities such as London, Stuttgart, Vienna and Paris are able to access a government agency website and interact with. These, according to Torres et al (2005), are not static websites that provide one-way information. These are interactive websites in which citizens are able access databases, secure information, and to share information with other government organisations. Torres et al (2005) states that site users can accomplish anything substantial online. Torres et al talk of a service which spans across governmental agencies as a whole and users and processes require not human employee intervention to be accomplished. At this stage, the question of how e-government is approached in Europe can be answered to a certain degree. From the article provided by Torres et al, it can be deduced that the initiative is taken by the governments which are customer service oriented. While on this point, one may point out with from Torres et al (2005)'s journal article there is no evidence of involvement of donor organisations which are known to urge governments in developing countries forward to ICT4D. Secondly, it can be deduced that a pre-requisite of citizen's access to ICTs is met. In order to provide such extensive services online, it would require widespread Internet access by citizens. Thirdly, e-government is provided with incremental sophistication.

Torres et al (2005) gives an account of a five step approach as an example. In step one an agency publishes information on a website. In step two an agency allows users to access its databases. In step three it permits users to access secure information and engage in transactions. In the fourth step users are able to personalise the service they get online. This services provision is incrementally sophisticated because in each subsequent step stringent security and authenticated measures need to be implemented. An argument can be put forth that e-government in Europe is information oriented and an easier to attain endeavour than in sub-Saharan Africa. Given the cases about, one can see that the e-government services in African were transaction oriented and specific to industry whereas in Europe they focus on information exchange as well as transactions across government agencies. Even though one can argue that it is relatively easier to set up interactive website than tax processing software, it should be noted that the e-services provided in Europe requires a good well maintained

Internet infrastructure. This is something that Schuppan states is still a luxury in sub-Saharan Africa.

3.5 Telecentres in Tanzania

Telecentres are the most tried form of ICT4D initiatives in developing countries. Mtega and Malekani (2009) point out that Senegal alone had over 9000 telecentres by the year 2000. Mtega and Malekani (2009) provide a journal article that examines telecentre user patterns in rural Tanzania. The purpose of this study is find information in this article that reveals how these telecentres were implemented in the rural communities of Tanzania. Mtega and Malekani (2009) reveal that Tanzania has an estimated number of 22 telecentres. For a bit of background on Tanzania, Mtega and Malekani (2009) explain that, like most poor sub-Saharan African countries, the majority of people in Tanzania live in rural areas and engage in agricultural activities for livelihood. The need for telecentres is explained clearly by Mtega and Malekani. They state that scientific knowledge and information about agriculture in Tanzania is produced by National Agricultural Research Institutes (NARIs). These include the Department of Research and Development (DRD) of the Ministry of Agriculture, Food Security and Cooperatives, Tropical Pesticides Research Institute (TPRI), Sokoine University of Agriculture (SUA), Tanzania Forestry Research Institute (TAFORI) and the private sector (Mtega and Malekani, 2009).

The problem arises when it comes to disseminating this information and knowledge to rural farmers who need it most. Mtega and Malekani do point out that Tanzania has a weak extension system to boot. The need and fit for ICT is therefore clear articulated by Mtega and Malekani for this reason. This is where the telecentre comes in. There are different types of telecentres. There are the basic telecentres that employ less complicated technologies and provide fewer services, civic telecentres which are public institutions that offer information services such as a public library, cyber cafés which are commercial enterprises and multipurpose telecentres which offer a wider variety of services. When it comes to the question of how telecentres are implemented in rural Tanzania, Mtega and Malekani provide clues in the form of decisions that need to be taken. It is evident that these telecentres are spearheaded the government, more specifically the Ministry of Agriculture in an attempt to provide agricultural information to rural farmers. Mtega and Malekani (2009) notes the support provided by IDRC, UNESCO, ITU, IICD and ECA in telecentre initiatives.

Mtega and Malekani (2009) state that the first step in implementing a telecentre is to decide which type of telecentre will be suitable in a particular area. They cite several factors such as literacy levels which determine ability to use sophisticated technologies, financial capabilities which determine sustainability, infrastructural development and people's information needs. From this information it can be deduced that perhaps the first step is to conduct research to determine these factors. Mtega and Malekani (2009) do not indicate how the community is involved in these initiatives. It is evident though that it is often an idea that originates from outside the communities, albeit from their government. The second step that Mtega and Malekani (2009) discuss is a telecentre catchment area. They define a telecentre catchment area as an area in which another telecentre can be established. The purpose of this exercise is to ensure that there is logic in the choosing of locations for telecentres and that they are within reasonable walking distances from residential areas. The third step that Mtega and Malekani suggest is a decision about the source of financial funding to keep the telecentre running. They suggest sources such as donors, government and fund raisings in the form of user fees.

With regard to the actual technologies that are implemented in the telecentres, Mtega and Malekani do point out that they vary according to community needs, ability to operate and financial resources. However a table they provide shows that the four telecentres that they assessed consist mainly of computers. Table 3 below summarises their findings.

Table 3: technologies found in telecenters in Tanzania

No table of figures entries found.	Kilosa	Mpwapwa	Kasulu	Karagwe
Computer	10	72	41	4
Fax machine	1	1	1	1
Photocopier	1	1	1	1
Printer	1	1	1	1
Radio and accessories	1	-	-	1
Satellite dish	1	1	1	1
Landline phone	1	1	1	1
Television set	1	1	1	-
Scanner	1	1	1	1

Table 3: Specific technologies in Tanzania telecentres (Mtega and Malekani, 2009)

From this table it can be deduced that the actual technology implemented in telecentres in Tanzania consist mainly of desktop computer with Internet access as well as peripherals such as printers and fax machines as shown in the table. What is learnt from the article is that telecentres in Tanzania are spearheaded by the government. It can be concluded that the government does conduct some research in the communities to determine suitability however the role or involvement of the community beyond being subjects and users is not indicated. The aim of the telecentres is clearly understandable and the technologies used to deliver the services are easy to identify. It is easy to relate the goal of the telecentres with the output. Mtega and Malekani (2009) conclude that the level of use of the telecentres that studies was very low, although insisting that the farmers lack useful information that they can get from the telecentres.

3.6 Closing the digital divide in rural America

Digital divide is the gap between individuals, households, businesses, and geographic areas at different socio-economic levels with regard to their opportunities it access ICTs and the Internet (OECD, 2001). The United States of America is a good example of a developed country. With that in mind, Parker (2000) reveals that a digital divide between urban and rural America does exist. This means that America, just like developing countries like South Africa, does have the problem of intra-country digital divide. However, Parker's (2000) article on how several rural communities in America have closed the digital divide reveals some vast differences between the circumstances in rural America and in rural sub-Saharan Africa as narrated by Schuppan (2009). To start with, unlike rural sub-Saharan Africa, rural America is not synonymous with poverty. Secondly, rural America has a long history of innovation. For example, Parker (2000) states that prior to World War I American farmers would create their own telephone lines which they would sometimes run along the tops of fences in order to achieve long distance communication.

Another vast difference that is worth noting between rural America and sub-Saharan America is that rural America is characterised by the absence of a large population (Parker, 2000). Mtega and Malekani (2009) point out that the majority of people in sub-Saharan countries live in rural areas. A similarity is that in both scenarios large companies do not generally go into the rural areas to invest because there would not be a sufficient return on their investment (Mtega and Malekani, 2009 and Parker, 2000). In both scenarios, companies prefer urban

areas where it is economically viable to invest. This then leaves development in the hands of the community, or their government. In this section, the focus of the study is on how ICT4D is implemented in rural America in an effort to close the digital divide. The attitude in America, as Parker (2000) reveals, is that communities tend to take charge and seek solutions just as the rural farmers did with telephone lines in the early 1900s.

Parker (2000) states that the first step people take in rural America is to raise awareness of a potential technological solution and form a cooperative that will work towards achieving a technological solution. Parker (2000) states that in America rural residents are capable of creating local initiatives to get some of their needs met. This shows that in their approach to ICT4D they are already empowered with certain capabilities. Another factor worth noting is that rural communities in America already have local ICT service providers, although they do not provide the extent of services that put rural citizens at par with their urban counterparts. Parker (2000) then reveals that the next step after raising awareness and forming a cooperative is that they approach local service provider. The service provider may be the local Telephone Company, Television Station or Electricity Company. In scenario in Oregon where a larger company was laying fibre optic cables through rural communities but without intention to provide broad-band Internet service to those communities due to lack of economies of scale, Parker (2000) states that the local governments of those communities formed a consortium that was able to raise funds to install infrastructure that would enable them to tap into the cables of the company. This is the infrastructure that the large company was refusing to install. According to Parker (2000), this is how the rural communities in Oregon were able to have access to broadband Internet.

There are several things to highlight from this account as to how ICT4D is approached in American rural areas. The first thing that can be noted is that people in rural America appear to be knowledgeable in terms of the technology that can meet their needs. This is evident in that they take initiative to seek the implementation of those technologies. It can therefore be determined that given Parker's (2000) account, the ideas in American rural communities come from within those communities. Second to be noted is that rural American communities are able to source funds and demonstrated by Parker (2000) in the both the Oregon case the farmers' telephone lines case. Third to be noted is that in even rural areas in America, ICT services are expected to be provided commercially. This is in contrast to sub-Saharan Africa where affordability to pay for services such as the Internet may be a barrier to adoption (Mtega and Malekani, 2009). Therefore within the steps to implementing an ICT4D

in rural America such as the broadband service in Oregon, means are made to make it commercially viable. Parker (2000) reveals that the consortium of local governments in Oregon rural areas contracted local service providers to deliver the service from the points of access at the fibre optic cables to the end users in the communities. This shows that ICT4D initiatives in America are needs driven and spearheaded by the community.

3.7 ICT in Indian agriculture

The agricultural sector in India represents both what has been achieved and what can be achieved with the use of ICT. Rao and Malhan (2008) provide an article that stresses the importance of information dissemination and the inherent important role of ICT in the Indian agricultural sector. To give a bit of background, India has over 1 billion people 70% of which live rural areas (Rao and Malhan, 2008). They state that the Indian agriculture sector accounts for 65% of India's labour force and 27% of its GDP. These figures highlight the scale of importance of the agriculture sector in Indian society. Rao and Malhan (2008) point out agriculture in India is nonetheless faced with challenges. Some of the challenges they point are climate change, a swelling population, disappearance of agricultural land due to real estate development and high costs of farming with low financial returns to boot. Not only does India have to deal with new challenges, but they have to increase their agricultural production to meet the demands of an ever increasing population.

On this note Rao and Malhan (2008) point out the state of technological advancement in the Indian agriculture sector varies between the extremes from highly sophisticated modern methods to primitive methods of ploughing using beasts of burden. They state that a 2008 National Sample Survey report revealed that 60% of Indian rural farmers had no access to agriculture technology be it machinery or information systems. Needless to say, the Union Agriculture Ministry was disturbed by this information decided to revamp the Indian Council of Agriculture Research (ICAR) to try and bridge the technology gap Rao and Malhan, 2008). It is the interest of this study to find how ICT4D initiatives are implemented in vast and diverse environment such as India. The importance of ICT4D in India cannot be overlooked as Rao and Malhan (2008) state that output could increase five-fold if national best practices based on knowledge that is already in use in some parts of the country could be employed throughout the country.

Rao and Malhan (2008) argue that in India, ICT4D is approached from a community perspective and from the government perspective. That is, in some cases ideas and initiatives are driven by community members and in some cases they are driven by the government in consideration of the needs of the people. In order to understand how this multidimensional approach unfolds, it is important to first pay attention to the problems that Indian farmers encounter and thus their needs. All these problems are pointed out by Rao and Malhan (2008). The first problem is that a majority of rural Indian farmers are not informed about best practices which are already applied in other parts of India. The second problem is that India has hundreds of languages and dozens of ethnic groups of farmers that hold different beliefs and ethical systems. Rao and Malhan speak of a caste system that exists within Indian society, particularly in the rural areas. All these are barriers that hinder communication and cooperation.

A second set of problems that are pointed out by Rao and Malhan emanate from outside the control of rural farmers. These problems include fluctuating market prices. Rao and Malhan make an example that for produce such as onions, potatoes and tomatoes, prices at a local market can fluctuate between Rs3/kg and Rs30/kg. This huge variation in the amount of market negatively affects the farmers from a business perspective and is compounded by that they cannot afford not to sell their produce at whatever price once they reach the market because they would go bad. Rao and Malhan reveals that farmers are usually forced to take loans in order to be able to continue with their farming activities which has resulted in a substantial number of them remaining in debt. Rao and Malhan also reveal that this problem is so severe that at one point the government decided to rescue the farmers from their loans in order to prevent an agrarian crisis. Additional problems emanate from the effects of climate change which result in crop failures.

Many of the rural farmers' problems can be tackled by providing machinery, resilient seeds and irrigation equipment. However, the interest of this study is to investigate how ICT has been used to mitigate and solve problem in order to assist rural Indian farmer to continue to develop. To transcend the problem of cultural barriers and lack of cooperation and information sharing, an organisation called ITC Company set up e-choupals in villages. E-choupals are initiatives by this company whereby the set up Internet infrastructure so that they can exchange information with farmers for purposes of providing advice and procurement of agricultural produce. Rao and Malhan state that advice is delivered in villages in local languages by expert panellists and by 2008 ITC Company had set up 5300 e-

choupals in 33000 villages. The problem that these e-choupals solve is that they provide useful information on farming practices using languages that the farmers from different backgrounds can understand and also provide them with opportunities to sell their produce at competitive market prices. This ideally can help farmers produce a bigger yield as well as sell at profitable prices, which can result in an overall improvement of their socio-economic status. This kind of outcome is not evident in Rao and Malhan's article however it is a reasonable prediction provided the information provided is timely and relevant and also taken advantage off by farmers.

In this case, it can be seen that an ICT solution was introduced into village communities by an outsider organisations. Rao and Malhan do not indicate if community members are involved in the implementation of the ICT initiative nor whether the community actually use the facilities. It is also not whether the e-choupals provide any other services other than agricultural information. From Rao and Malhan's article it can be deduced that the e-choupals initiative is growing because they state that ITC was targeting to set up 20000 more e-choupals by 2010. Although there is no indication as to how they are sustained or if revenue is made from them, it can be assumed that they do produce sufficient revenues which would warrant the continuing investments in them by a private company. It is not clear how the e-choupals are different from telecentres, particularly from a hardware point of view. It is also not clear whether an e-choupal is a type of telecentre. A difference can be assumed in that unlike telecentres, e-choupals are initiatives that are started and run by a private company which implies they are commercially viable, something that telecentres are not known for. Also, Rao and Malhan (2008) mention that telecentres can provide a wide range of services such as access to computers, Internet, application, training, research facilities and that they are normally targeted to all community members as opposed to a specific group like farmers.

Rao and Malhan (2008) mention another ICT4D initiative called AGRISNET which was spearheaded by the Indian government with the intention of improved services to farmers through the mobile telecommunication technology which is already prevalent in Indian society. Rao and Malhan state that by 2008 every fifth person had a mobile phone in India. AGRISNET is a portal that allows farmers to access services online through their mobile phones. In this initiative, although it is also initiated from outside the community itself, consideration must be given that it is designed to utilise technology that is already in use in the community. Therefore this is another way in which ICT4D is implemented in India, in a manner that the new ICT initiative complements an ICT already existing within that

community. This is an approach that is frequently seen in ICT4D as with the case of the R Labs in the Western Cape in South Africa.

Another way in which ICT4D initiatives have been seen to begin in India is by innovative community members themselves. Rao and Malhan (2008) provide a case about a farmer from Baramati called Ajit Kate. Mr Kate own milk cows and sells milk. Technological improvement in Mr Kate's farm has not been limited to ICT. Rao and Malhan state that Mr Kate has set up infrastructure to automate milking of the cows and has refrigerators, which allows him to produce more milk than he has to sell immediately. This is the part in which technology has help Mr Kate improve his output and possibly increase his revenues. Rao and Malhan reveal that Mr Kate added computer technology to help manage is business. They state that Mr Kate has a computerised database that stores detailed information about his cattle. The information includes details relating to the animals' health, nutrition, diseases and breeding. The outcome of having such information is the improvement of the quality of milk produces, which according to Rao and Malhan, Mr Kate says it improves the odds of selling every drop of milk he produces. Here Rao and Malhan show that ICT4D can an idea and initiative of the farmer. It is not clear whether Mr Kate developed the database himself, but it is worth noting that Internet access is not at least a primary goal in this initiative. It is clear how and how Mr Kate uses this ICT and how it benefits him. This case is unique to all the cases provided in this study in that it an individual's initiative, yet it captures the principles of what ICT4D is all about.

3.8 The process approach

Walton and Heeks (2011) propose another way in which ICT4D can be implemented. They argue that their proposed framework would yield more success taking into consideration five key factors that would diminish the design-reality gap. They define a design-reality gap as a situation whereby the design of an ICT project does not match the realities on the ground. Walton and Heeks believe that design-reality gap is significant cause of failure for many ICT4D initiatives. The five factors that they believe to be key for ICT4D success are; community participation, flexible approach to project planning, learning from failures, involving local institutions and strong leadership. It is noteworthy that Richard Heeks is a prominent researcher in the ICT4D field. He has been critical of ICT4D implementation methods yet supportive of the ICT4D idea itself. An example is a 2009 working paper

publication titled ‘The ICT4D 2.0 Manifesto: Where next for ICTs and international development?’

In this publication, Heeks (2009) states in order for ICT4D to start yielding success several things must change. Among these, he proposes that new technologies will be required, which might be call to move from computers to mobile devices. He proposes that there needs to be new approaches to innovation and implementation, new intellectual perspectives and a new view of the world’s poor. With all this said, Heeks (2009) does not put forth any implementation model or framework, until this 2009 publication with Walton. Heeks’ belief about the potential of ICT4D is consistent, despite conceding that the field has been plagued with failure. His contribution as to how ICT4D projects should be initiated and implemented is therefore of great interest to this study. At this state particularly, this study is interested in the implementation methods of ICT4D initiatives and does not make judgements or speculated about their success or failures. The idea is to understand what happens. Taking into account Walton and Heeks’ ideas will help draw a contrast with the methods are seen ICT4D initiatives such as the ones already discussed in this chapter of the study.

Walton and Heeks (2009)’s proposed framework is called the ‘process approach’. Walton and Heeks do not assert that the process approach method would certainly bring success. They explore the idea with logical arguments such as the five key factors that have already been mentioned. According to Walton and Heeks the process approach is an alternative to the prevalent top-down approach. The top-down approach is a kind of approach to development whereby ideas flow from outside stakeholders such as sponsors and researchers into the communities in which development initiatives are being carried out. The problem that Walton and Heeks Walton express about the top down approach is that the flow of ideas from outsiders into the communities fails to capture accurately the contexts of those communities. They argue that without proper engagement of local people, no matter how noble one’s intentions are, it is unlikely that an accurate requirement analysis can be carried out. In other words, Walton and Heeks believe that with the top down approach a design-reality gap is almost inevitable.

Walton and Heeks’s process approach is going to be discussed according to the five key elements. It can be outlined that the basic idea of this process approach is to apply an evolutionary method in the approach of ICT4D. That is, implement ICT4D in a manner of increasing complexity ensuring that each preceding goal is achieved. Therefore the project

would evolve as it continues and accomplish more sophisticated tasks as opposed to trying to solve several problems in a single structured approach. The first element that Walton and Heeks discuss is participation of local community members. Walton and Heeks (2011) lament the lack of beneficiary involvement from the inception of an ICT4D initiative through its development. Although involving the users and beneficiaries of technology solutions that are being designed may sound like a logical thing to do, Walton and Heeks argue that this is not the case. They allude to saying that with the top-down approach, the drivers of initiatives conduct a study or problem analysis and thereafter conclude that they produce a fitting solution. With the process approach, Walton and Heeks propose that consultation and participation of the users is a continuous and iterative exercise aimed at developing a strong connection with the local context. Heeks (2009) states that a new view of the world's poor is required. In the process approach he states that the ICT4D beneficiaries, which would be the world's poor, should be considered as an information resource with regards to what solutions are needed and how they can be implemented effectively.

The second key factor in the process approach that Walton and Heeks discuss is rigidity in delivery approach of ICT4D. They are quick to point out that rigidity most likely emanate from that the two domains that drive ICT4D are structured in their approach. These domains are information systems and development (Walton and Heeks, 2011). They argue that these two domains are characterised by structured methodologies such as Structured Systems Analyses in information systems and LogFrame in development. They state this rigid structures approach manifests itself in the top-down approach common in ICT4D. They argue that it is perilous to apply a structured, rigid approach in an initiative where context may have been unknown prior to initiating a project. In other words, Walton and Heeks imply that a pre-determined outcome of how an ICT4D solution will function is problematic in the development context and leaves plenty of room for design-reality gaps. To cement that argument, Walton and Heeks state that needs and circumstances of people in need of development are not stagnant. They change and therefore require flexibility in solution approach.

They propose that with the process approach, such flexibility can be attained. Walton and Heeks state that with the process approach, the goals and methods of attaining them are open ended. The decisions are taken continuously after constant consultations with the intended beneficiaries. Walton and Heeks argue that the process approach provides a dynamic approach where goals and design remain adaptive to emerging challenges and strategies.

The development of goals and design in this process is therefore evolutionary, taking cognisance that more information and even skills become available over time (Walton and Heeks, 2011). If a project is approached using the methods, even though a project may be initiated by outsiders, it can be argued that the solution to problems are ultimately sources from the beneficiaries themselves. In other words, it can be concluded that beneficiaries are given a platform, guidance, resources as well as awareness of possibilities in which ICT can improve their lives after which they make a contribution of information about their needs and community dynamics.

The third key factor of Walton and Heeks's process approach is to learn from errors. Walton and Heeks (2011) reveal that the typical top-down approach has three responses to error. These are denying error, externalising it, or embracing it. They elaborate on each of these responses. They state that denying error is when an organisation deceives itself and refuse to accept that an error had occurred. They cite an examples Thai food company system which due to limited scope ended up running a new automated system alongside the old manual one. The company refused to acknowledge that the new system is failing to replace old methods. With regards to externalising error, Walton and Heeks (2011) state that this is when a defeat is suffered due to error. This would be a fatal outcome to a project due to error such as having that project called off. The third response, embracing error, Walton and Heeks (2011) explain that it when errors are treated as lessons learnt.

Evolution, as with learning, happens in stages. At any stage where an error occurs, iterations can be undertaken without jeopardising the whole project. This is the argument that Walton and Heeks (2011) are trying to put forth for the process approach regarding flexible planning and recognising errors as lessons and fixing them. Errors are not to be considered as failure nor be denied in the process approach. They argue that a project should be treated as a continuous experiment and risks should be anticipated. The need to learn from errors raises another change that Walton and Heeks (2011) propose needs to be considered. This is change to the length of time that should be expected for successful ICT4D initiative to take. They point out that often ICT4D is expected to deliver results quicker than traditional methods of development because of its ability to allow for long distance communication.

Walton and Heeks (2011) argue that the eagerness to achieve quick development results is often the very cause of failure to deliver results. They argue that not only does the rush make it impossible to react to unexpected social changes that could not have been predicted and

planned for, but also leads to failure to develop methods to mitigate risks. They propose that in the process approach, a project should take ten to twenty years as opposed to the two to three years currently expected of projects to deliver results. Their argument is based on the premise that one can accumulate more knowledge in ten years than in two. Another aspect of learning to consider is that of the beneficiaries. If sustainability is taken into consideration, the time has to be allocated for community beneficiaries to learn to use, maintain, manipulate and improve the technology that drives their development.

Walton and Heeks (2011)'s fourth key factor is the inclusion of local institutional capacities. This factor speaks to sustainability of ICT4D initiatives. Indeed sustainability is a difficult claim to make as it would require explicit criteria that may be measured over a given period of time. However developmental success may be difficult to measure because of the many dimensions that it can take. It is therefore difficult to pre-determine the sustainability of an ICT4D initiative either using the top-down approach or the process approach. Walton and Heeks (2011) put forth an argument that, difficult as it may be to pre-determine sustainability and measure it, mitigation measures can be taken to ensure that an initiative is successful to a greater extent. They point that the typical rhetoric in the top-down approach is to provide technology that enable beneficiaries to achieve certain developmental needs.

Walton and Heeks (2011) state that the process approach would strive not only to involve local capacities such as small business, but also to build new local capacities so that they may eventually grow and expand the ICT4D initiative on their own. Walton and Heeks (2011) state that from the point of view of the process approach, it is no more important to provide local communities with front-end services than it is to teach them how to develop back-end services. This argument becomes particularly valuable when one considers that most ICT4D initiatives in developing areas are commissioned by donors (Heeks, 2009; Schupan, 2008). This poses the challenge of having enough skilful and determined people to sustain an initiative once the donors have left. Walton and Heeks (2011) argue that sustainability then becomes as much a matter of skill retention as it is a matter of financial availability. They point out that telecentre projects in the 1990s and early 2000s fell into the category of failures due to lack of local remaining skills quite often.

While still on the point of skills transfer and developing of local institutional capacities one may point out that Walton and Heeks's (2011) process approach shows consistency in its recommendations. Taking into consideration that Walton and Heeks (2011) recommend that

a project should be developed cumulatively over a period of ten to twenty years while heavily involving local communities as sources of knowledge and direction, it is conceivable that in the end local communities may be able to take over and continue developing ICT solutions themselves. Indeed there is so much about technology that one can teach rural people who are often found to be illiterate within a space of three years. However in a space of ten years or more, it can be argued there would be at least a generation that has grown up with the exposure and opportunity for ICT understanding.

The fifth and last key element that Walton and Heeks (2011) discuss is leadership. They immediately state that effective leadership is critical for project success. They point that all the four key elements that have been discussed thus far will depend on good leadership for effective execution. Walton and Heeks (2011) make a distinction between project management and leadership. Before these are discussed, it may be important to express Heeks' (2009) views on project leadership in the top-down project approach. In his manifesto for ICT4D 2.0, Heeks (2009) asks the basic question, why ICT4D? Heeks (2009) suggests that at least in most cases ICT4D initiatives are ideas of ICT professionals who seek to do something different with their skill other serve the wealthy corporations that they work for. Heeks (2009) states that the first set of professionals are those that seek to feel redemption. These are the professionals who would feel that spend their lives bringing efficiency to organisations that are already very efficient while the world have serious problems such as poverty reeks of moral decay.

Heeks (2009) claims that driven by a sense of guilt, these professionals may then get involved in an ICT4D initiative. The second set of professionals that Heeks (2009) feels drive ICT4D initiatives are those that recognise that if problems that are prevalent in under developed areas continue to grow, they will eventually start to affect even those that live in developed areas due to globalisation. They fear consequences such as terrorism, disease epidemics and rise in crime. The last set of professionals is one that Heeks (2009) feels are driven by personal self-interest. These are people that according to Heeks (2009) would find it to be a more fulfilling and gratifying feeling to design a system for use by needy people than for a for a profit making organisation for example. According to Heeks (2009) this provides the answer to the '4D' component of ICT4D. Although the involvement of any of these professionals for whatever reason is not discouraged by Heeks (2009), he argues that they embody the top-down approach it does not fit with the principles of the process approach with regard to project leadership and management.

Walton and Heeks (2011) view this as a lack of commitment in leadership and a cause for project failure. Their process approach recommend committed leaders and managers that will spend the needed amount of years on the project in order to gain a full understanding of the local context and make sense of lessons learnt from past errors. They argue that the first four key steps require such dedication from those that head ICT4D projects. Walton and Heeks (2011) make example about the Swedish International Agency. They state that the agency supported a number of ICT project in Universities in a dozen of developing countries. However, the agency acted as a donor that came with ideas but did not provide project management services to deliver the goals of their ICT initiatives. Walton and Heeks (2011) state that the project suffered serious problems due to poor management and lack of leadership.

With regards to the distinction between leadership and project management, Walton and Heeks (2011) state leaderships has to do with driving institutional changes and sustainability demands. In other words, leadership may be viewed as a board of directors. On the hand there is project management. Walton and Heeks (2011) state that project managers apply management skills and experience to steer project development in the right direction. Project managers are the planners and decision makers. Walton and Heeks (2011) state good leadership would be one that is able to allow project manager the freedom to manage projects and make decisions. This would require a less rigid and less bureaucratic leadership structure.

When using the process approach, Walton and Heeks (2011) would suggest the Swedish International Agency for example, would have provided leadership on the projects in terms of what they would like to see them achieve. However, they would have to appoint project managers that would spend time on the ground planning and strategizing on how to achieve goals and solving problems that arise as they go along. According to the process approach then it is not enough to provide an idea, money and a wish list. ICT4D initiatives are to be treated seriously as any sophisticated project that is being developed in a dynamic environment and thus managed accordingly.

Rose and Scheppers (2001) discuss the relationship between social structure and the use of information systems (IS). They state that there are two processes involved to link social structure and IS practices. The first process pertains to analysing social situation and second process pertains to designing and implementing information systems to support it. These

steps are depicted by Rose and Scheppers as complimentary to each other. It is at the stage of understanding the social situation that Gilwald (2010) points out rigidities that are an outcome of the reluctance of political authorities in developing countries to have their societies studied due to fear of losing their political credibility. In other words, the leadership structures in developing countries cause a hindrance to research activity that would reveal the dynamics needed for successful information systems practices.

Harris and Spillane (2008) discuss a leadership system that is gaining popularity. They call it distributed leadership and define it as leadership system that has a configuration of a lateral and flat decision making process and emphasises team work as opposed to a small group of champions. This leadership system is less bureaucratic and more democratic as decision making power is not concentrated among few individuals who might be more concerned about their personal interests. Although Harris and Spillane (2008) admit that this leadership system remains a conceptual idea without known practical success in a real society, they argue that there is empirical evidence that such a leadership system does have a positive outcome with regards to flow of ideas and efficient practices in society. These are factors that are considered as desirable for information systems practices by Rose and Scheppers (2001) and are said to be lacking in developing countries (Gilwald, 2010).

3.9 Implementation by ICT policy

Gilwald (2010) proposes that there could be a different approach to ICT4D execution. Gilwald makes a strong argument when he points out that in developed countries where ICT is most prevalent and seen as successful was not implemented through donor or charity means as is the case with developing countries. She argues that characteristically, developed countries achieved ICT penetration by implementing policies that promote competition and consequently drive down the prices of purchase and maintenance of ICTs. She states in her article that she attributes the failure to deploy ICTs in developing countries to poor ICT policy outcomes. She states that in Africa ICT sector policy reforms have been sparse and even resisted by those in power. Gilwald decries this situation because she believes there is plenty of evidence across the world that changes in policy do yield results.

It can be noted that the unwillingness to make reforms in terms of policies is not the only thing that Gilwald decries as the cause of failure of ICT4D in Africa. She also states that not

enough research has been produced by Africans themselves to investigate the political landscape responsible for introducing reforms. She argues that such research would help to inform policy formulation. However, the political landscape remains untouched by ICT4D researchers and policies that permit monopolies remain in place in some African countries. Gilwald raises another notable point. She states that often research in Africa, even when pertaining to ICT4D, tends to have an inclination towards economic development. She states that this is the case despite Roller and Wverman's (2001) work which proves no causality between economic growth and ICT penetration. The point that Gilwald is trying to make is that instead of concerted attempts to implement ICT4D, whether for economic development or to achieve the wider scope of development, it would be better implemented through policies that will result in the spread and pervasiveness of the technology across society.

Gilwald (2010) supports her argument by stating the pervasiveness of ICT, such as mobile phones, brings different kinds of benefits to people. By definition this would fit within the scope of development, but not specifically targeted to any goal like economic development or disease control. She states that poor people have been found to be resourceful with mobile phones to the point of applying them to new uses that even the manufacturers had not intended. She argues that ICT4D can be implemented by simply creating an environment where poor people can be able to acquire the technologies on their own and utilise them for their unique needs. This would be an environment where the ICT sector policies foster competition, which in turn drives prices down and enables the poor to afford acquiring and maintaining ICTs.

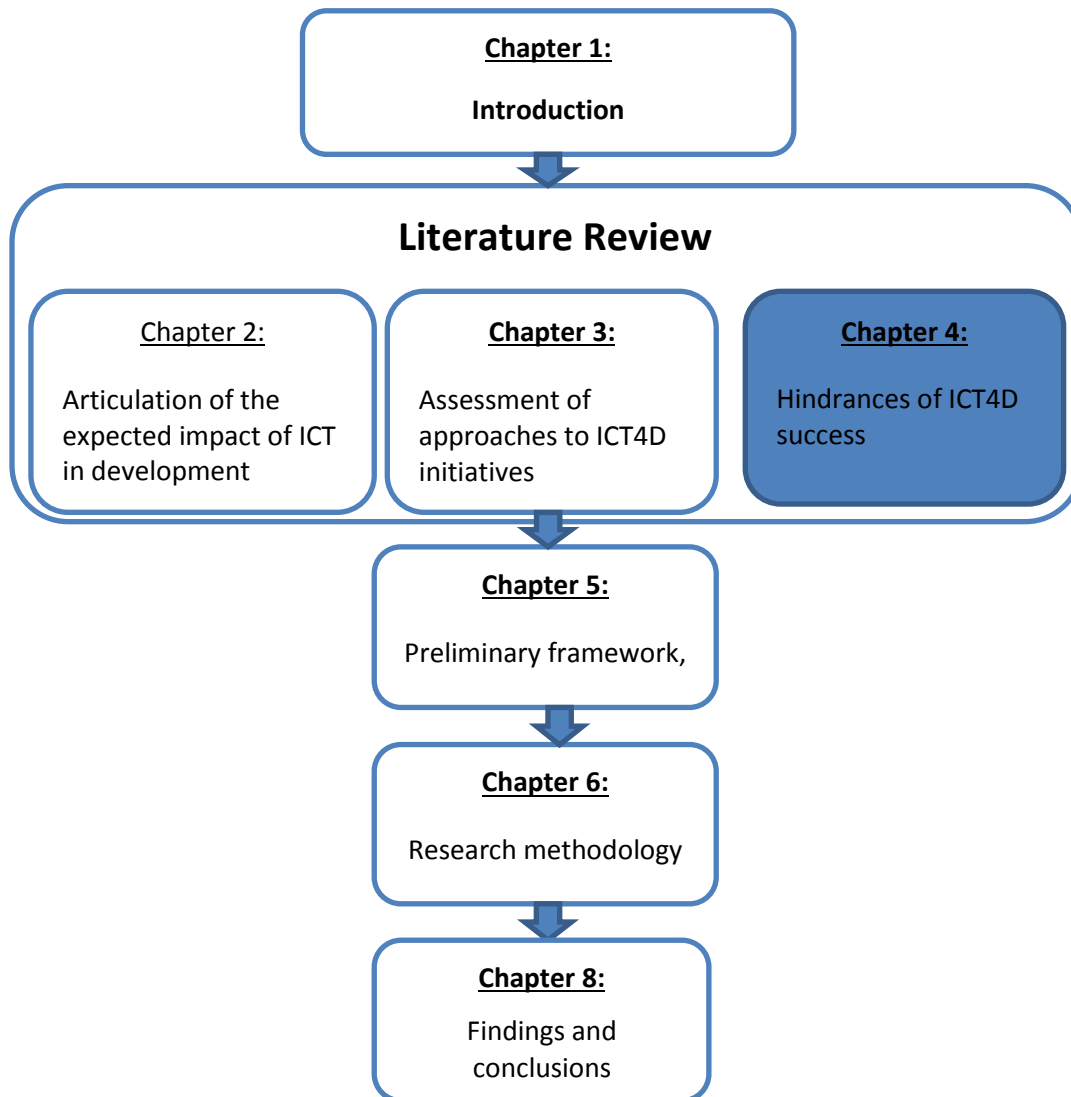
3.10 Conclusion

This chapter explores several ICT4D projects with the aim of revealing how some ICT4D projects are being undertaken. The goal of the chapter was to reveal information that is relevant to the framework that the study seeks to develop. When studying the RLabs in the Western Cape, it was discovered that an ICT4D initiative can be an initiative of members of the community. Parker, Wills and Wills' (2012) arguments show that the project was the brainchild of community members who wanted to improve the conditions that prevail in their community. The study of the RLabs shows that the initiators of the project sought assistance from other organisations such as an NGO, as well as the Cape Peninsula University of Technology. This made the project a multi-stakeholder project. The literature

shows that it is typical for ICT4D projects to be executed as collaboration between several stakeholders regardless of who initiated it. Indeed the other projects studied in this chapter substantiate this assertion as they are all being implemented by multi-stakeholder partnerships. This is one of the most obvious trends in the implementation of ICT4D.

The study also looks at ICT project in developed countries. The information that emerges from this literature confirms that developed countries do not face the same level of challenges as developing countries. For example, it is shown in the literature developed countries do not start from a poverty situation. Parker (2000) shows in America, rural people are knowledgeable about their ICT needs as often they already have local telecommunications companies on which they seek to improve their access to ICTs. This revealed the difference in the implementation process between developing and developed countries. The study also reveals that the bottom-up approach needs to be given more attention. Lastly, the study in this section shows that with regards to policies that would be conducive for ICT4D, developing countries are lagging behind. It reveals that in developing countries, government do tend to resist policy reforms.

4. Chapter 4: What is hindering ICT from making an impact?



4.1 Introduction

The rate of failure of ICT projects is comparatively high. In business ICT has a failure rate mostly due to errors in design (Thanasankit and Corbitt, 2000). Heeks (2009) argues that there is hardly any evidence of success in development. It is in the interest of this study to identify and explain the reasons for which ICT in a developmental setting has the highest failure rate. This study seeks to contribute a framework that can be used in rural areas in South Africa to implement ICT for Development (ICT4D) projects. It is therefore important to understand some of the pitfalls that have affected many other projects.

In this section of the study, this researcher examines some causes of ICT4D project failure that have been identified by other authors. The purpose of this exercise is to give the researcher the insight to produce a framework that is equipped to with ways to mitigate these risks. Sources of ICT4D project failure such as poor policies, unrealistic expectations, understanding of development and project management are discussed in this section.

4.2 Symptoms and Causes of Failure

4.2.1 Poor policies

Amongst the suspects for the widely acknowledged failure of ICT for development in developing countries are poor policies. Galperin (2001) believes that failure of ICT4D is due to badly formulated policies. Usman and Said (2012) argue that the issues of Internet inaccessibility in Africa can be remedied with effective implementation of formulated policies. Torjman (2005) defines a policy as a “deliberate and careful decision that provides guidance for addressing selected public concerns”. Usman and Said (2012) argue that if the national policy of a country does not foster ICT progress it is difficult for business sectors operating in that country to formulate better policies for themselves. On this note, Usman and Said (2012) state that countries should not make superficial policies that they cannot live up to as they liken a policy to a plan of action.

Galperin (2001) illustrates how badly formulated policies can have negative effects. Galperin (2001), states that in the past, national policies in developing countries were formulated based on the discourse of a digital divide. Galperin (2001) believes that this discourse was incorrect and has led to bad policies in developing countries. Galperin argues that the digital divide

discourse promoted the thinking that ICT4D will be successful by just getting all people connect to the network. Chaudhuri (2012) agrees with Galperin. Chaudhuri (2012) points that the One Laptop Per Child initiative for example has not made an impact in education despite the fact that it has been attempted in both developing and developed countries. He argues that this thinking led to policies that implicitly assume that all countries would “converge” on a similar path of ICT infrastructure. Galperin (2010) believe that such policies are foul because they assume that ICT for development can unfold in a uniform fashion whereas all developed countries achieved success in different ways.

Gillwald (2010) also points to poor policies for the lack of capacity building strategies. Usman and Said (2012) point out that the main purpose of policies is to improve capacity and competitiveness. Gillwald (2010) believes that ICT policies in Africa remain relatively poor because of lack of critical research at indigenous level. Gillwald believes that as a result, there remains no evidence to link ICT policy reforms that are aimed at increasing penetration and lower costs of communication to growth, development and poverty alleviation.

It is not just lack of research that Gillwald (2010) believes is the cause of poor ICT policies in some developing countries, particularly Africa. Gillwald (2010) discusses the issue of African states resistance to reform. Gillwald explains that there typically antagonism from developing countries to critical assessment or research of the state. As a result, Gillwald points that African academia has historically not examined ICT policy issues critically. She explains that a lot of them would like to maintain the false duality that was central to the Washington Consensus in the 1990s. Gillwald explains that this duality erroneously remove the role and impact of the state on the market.

Usman and Said (2012) draw focus to the ambiguity of policies. For examples, they quote from the Nigerian national policy on telecommunication which read “there is a need to ensure that government and other public buildings are computer-ready smart buildings.” Usman and Said (2010) argue that this policy statement is vague. They argue that the lack of definition of what computer-ready smart building entails would make it a challenge to implement this policy on the grounds that the practical goals are unclear. On this note, Usman and Said (2012) argue that many ICT policies in developing countries are ambiguous over-arching statements for which there is not plan of action.

In the second chapter of this study this author argues that the notion of a digital divide implies a techno-centric problem and solution. This can be derived from Rao's (2009) definition of digital divide which states that it is the gap between those who have and those who do not have access to technology. This implies that if technology were to be made accessible to those who do not have access to it, then digital divide would have been closed and thus ICT would deliver on its development promise. However, Chaudhuri (2012) punches holes in this notion. Chaudhuri (2012) classifies ICT4D project into four distinct conceptual categories. One of these categories is the supply of computational hardware to underprivileged communities with the aim of helping them develop. Chaudhuri (2012) explains that the rationale is that the supplying of cheap or free computers is considered the most intuitive way to bridge the digital divide. Proponents of this drive, Chaudhuri (2012) continues, are under the impression that "computers inject a clear positive productivity effect in all activities".

4.2.2 Hype

One of the downfalls of ICT4D that authors in the field often point out is that unrealistic expectations. There is consensus among authors that ICT does have the potential to deliver on development. In the second chapter of this study it is shown that from the onset of the history of ICT4D its envisaged impact was never based on evidence. Heeks (2009) argues that from the beginning ICTs were tools in search of purpose. In 2012 Chaudhuri (2012) published a paper titled "ICT4D: Solutions seeking problems?" In this paper Chaudhuri (2012) questions the continued support for ICT4D arguing that it has never been able to deliver on its promise. Weber and Toyama (2010) point out that ICT4D is rhetoric that is not founded on good evidence. It is evident that these authors are saying that so far ICT4D has been nothing but hype.

Heeks (2009) and Wertlen (2008) provide some of the explanations where this ICT4D hype comes from. Heeks (2009) attributes some of the hype to a coincidence that took place in the mid-1990s, whereby development was at the top of international political agenda while at the same time the Internet had become a household name. Indeed Heeks believes that the United Nations (UN) through closely associating the Millennium Development Goals (MDGs) with ICT bears some responsibility in the hype about ICT4D. This notion is supported by Zhao (2008) who quotes that UN as saying "although the costs of using ICTs to build national

information infrastructures which can contribute to innovative knowledge societies are, the costs of not doing so are likely to be much higher”.

Zhao (2008) states that powerful international organisations such the World Bank and International Telecommunication Union (ITU) encourage developing countries to invest their resources in ICT4D. Wertlen (2008) reveals the reasons behind the push for ICT4D. Wertlen (2008) states that it is projected that future modes of production will increasingly require information resources. This means the populations that will be without the means to access information will be increasingly disadvantaged. Heeks (2009) reveals that this push for ICT4D thus stems from projections of the world will function in the future as opposed to real experiences.

Marais (2011) reveals some of the problems with the ICT4D hype. Marais points out that ICT4D often come with the promise of what some authors call “leapfrogging” type of development. Marais explains that “leapfrogging” would mean that ICT allows developing countries to quickly catch up with the rest of the world in terms of development by skipping some intermediate stages of industrialisation. As Marais points out, this is a view that widely held in light of the belief that development in the future will be determined and characterised by the means to access information. However, “leapfrogging” may not be possible.

Galperin (2010) states previous expectations of ICT4D may have been too optimistic and over ambitious. To start with, Galperin (2010) points out that a developing country cannot “leapfrog” over their poor ICT infrastructure legacy. Indeed ICT requires infrastructure. Galperin (2010), mentions that at present there is a drive to install fibre optic cables, a development intermediary that must be addressed if the future will depend on broadband availability. The case of bridging the digital divide in rural America that is looked at in the third chapter of this study may be revisited in order to highlight the challenges of setting up infrastructure.

Parker (2000) narrates the difficulty faced by the rural territory of Southern Oregon whereby in 1999 a long-haul fibre optic provider wanted to bury fibre optic cables past the community but without any intention to install Points of Presence for the communities there to access the infrastructure. Galperin (2010) explains that companies are usually reluctant to put develop infrastructure in rural areas because there will be lack of economies of scale due

to either low buying power or few number of people which limits their market incentives. Parker (2000) points out that this is equally a problem both in developing countries and rural America. Parker (2000) states that the only way Southern Oregon was able to access the fibre optic infrastructure was having all the Oregon counties and municipalities form a consortium and among other things raise funds to purchase and install electronics needed for Points of Presence as well as to create a viable rural network. It is worth mentioning that Parker (2000) does state that typically rural American areas usually have local telephone companies and electricity companies. This shows that even with a better infrastructure legacy, it is still difficult to set up infrastructure for modern ICT for rural areas.

Galpren (2010) argues that the ICT4D hype leads developing countries to fail to foresee such important requirements and challenges. Chaudhuri (2012) agrees with this view. Chaudhuri states that even the poorest of countries in the world with high levels of illiteracy and technical backwards have put a lot of faith on ICT to bring about rapid socio-economic transformation. For instance, Chaudhuri states that Lesotho is planning to use ICT to create a 'knowledge based society fully integrated in the global economy by the year 2020'. This is despite that Lesotho is ranked 160th out 180 countries in Human Development Index (HDI) based on 2011 data (Chaudhuri, 2012). Chaudhuri says this faith is naïve. Heeks (2008), states that the problems with rural ICT initiatives is that the skills needed to maintain such development do not live there. Lesotho provides a good example of the point that Chaudhuri (2010) is making. Their HDI shows that it is likely to remain hype that they will build and run a knowledge society by 2020 in respect of their HDI which suggests they hardly have the necessary skills in the country.

Hype and rhetoric causes ideas to go unquestioned. Heeks (2005) questions the MDGs themselves, which many developing countries that are member states in the United Nations including South Africa signed up to pursue and implement. Heeks questions the MDGs from a practical perspective. He argues that no developed country achieved its development through MDG style goals. Chaudhuri (2010) agrees, pointing out that the dissemination of mobile phones in developing countries has hardly been influenced by formal policy. Heeks (2005) points out MDG number 7 is to ensure environmental sustainability, yet developed countries got rich using environmentally degrading methods, including China, which Heeks points out that has lifted 200 million people out of poverty in the past 20 years. Heeks is pointing out that such hype as the MDGs and indeed ICT4D may be detrimental to a

country's development. He advocates that before developing countries buy into the hype the need to check for suitability to their circumstances. Tongia and Subrahmanian (2002) allude to saying that the ICT4D hype creates a situation of bread versus computers in developing countries.

The hype does not serve ICT4D well when it comes to implementation on the ground. It may be instrumental towards the setup of hardware. However, when it comes to adoption and usage the hype does not have any bearing. This is the reason Heeks calls ICT4D initiatives rusting tractors of the 20th century. The hype creates a notion of ICT4D that Van Reijswoud (2009) calls a "one size fits all notion". The hype in a way dupes developing countries into thinking that the very presence of ICT will yield developmental benefits, and they neglect to the customization and localisation of both technology and ideas that may be necessary. Also as pointed out in this section above, they also fail to prepare for some foreseeable requirements such as local skills permanent presence.

4.2.3 Ambiguity

At this stage of the study, this author has read a numerous reading on the subject of ICT4D. One of the most common opening lines to many papers is the declarations of the potential benefits of ICT in development. The specific benefits and how they can be achieved remain ambiguous. Ambiguity stems from that the definition of development remains open and ambiguous, the link between ICT and development remains ambiguous, the development lifecycle of ICT initiatives remain ambiguous and indeed a point at which an initiative can be deemed a failure or a success remains ambiguous.

Perhaps the first ambiguity that deserves to be addressed is the meaning of development. In the first chapter of this study it is pointed out that there is no single agreed upon definition of development due to its complexity (Thomas, 2004). Szirmai (2005) states that the term 'development' is often used casually in such phrases as development studies, developing countries, development aid, development strategies, development policy, and indeed ICT for development. Szirmai (2005) points out that these phrases often translate to some development goal while development itself remains open to interpretation. This is what ambiguity is. In the first chapter of this study the subject of development is addressed whereby three notions of development according to Gore (2000) are revealed. It is stated that

Gore's notions of development are; long term structural societal change such as the shift from the community Soviet Union to modern day capitalist Russia, planned desirable changes such as improvement of socio-economic conditions, and lastly, achievement of ideals such as spirituality and culture.

Szirmai (2005) continues with his discussion on the topic of development. He states that term 'development', whatever the notion or context of use, implies an upgrade to a more desirable state. Effectively, being underdeveloped means to be in a lesser desirable state while being developed means to be in a more desirable state. Szirmai explains that this implicit upgrade only widens the scope that the term covers. He makes an example to highlight the kind of complexity that can occur. He states that if development is defined as growth of income per capita, it would be difficult to explain why life expectancy for African Americans in urban areas is lower than that of people in the Indian rural area of Kerala, yet the Americans have a higher income per capita. This means development can neither be viewed in terms of income per capita and its determinants only nor can it be viewed in terms of life expectancy and its determinants only. The scope gets wide leading to complexity and ambiguity. Thomas (2004) agrees with this view stating that development remains a concept that is contested both theoretically and politically.

In the second chapter of this study the role that ICT need to play in development is articulated. The immediate challenge was to identify the outcome that ICT is supposed to deliver as per its objective, in which case that outcome would be considered an example of development. The role of ICT could then be determined from what it delivers. Ambiguity showed itself in this challenge because it would have been inaccurate to isolate a single or a few deliverables and bestow upon them the title of development. The approach that was taken by this researcher was to identify milestones that are widely accepted as development. The milestones that were chosen were the MDGs. However, Szirmai believes that this does not help in reducing the ambiguity in identifying or defining development.

He puts forth the argument of hype with regards to development initiatives. In doing this, Szirmai first puts forward his observation that within the scope of development, there is a characteristic heavy involvement of people and organisations on the facet of development which is about improving economic growth and raising the standard of living for people. This is the facet of development in which the primary is to reduce or eradicate poverty. Szirmai is

referring to Gore's second notion of development, which it is mentioned in the first chapter of this study that the term 'development' will be used to refer to throughout this study. This is the notion that states that development means planned desirable societal changes with the aim achieving advancement that will benefit society. Thomas (2004) adds some weight to Szirmai's observation as he states that the term 'development' has taken on a narrow meaning of the practice of development agencies whose aim is typically reduce poverty.

Szirmai argues that the heavy involvement of people and organisations in these endeavours, benign as they may be, results in the problem of ambiguity. He explains that often the outcome of the 'heavy involvement' is a succession of ideas, goals and slogans. He states that it is a common characteristic that these goals and ideas are short term, aiming for result within a decade or two. He points that the MDGs are one such good example. Szirmai argues that as a result of the endless influx of ideas, goals and slogans, it becomes difficult to distinguish between desirability and reality. This is a state of ambiguity. He points out that one of the major mistakes that typically arises in the midst of all the slogans are development policies that are a direct result of erroneous advice from development advisors and experts. To substantiate his argument, Szirmai states that during the industrial revolution in the 1950s the agricultural sector was neglected with regards to developmental policies of the day.

Indeed the example about Lesotho that is cited by Chaudhuri (2012) to further this argument. Chaudhuri points out that it is a policy of the government of Lesotho to create a 'knowledge based economy' by the year 2020. On the other hand, Lesotho's HDI ranking of 160 out of 180 countries suggest that the development of skilled human resources is being neglected in favour of ICT infrastructure. The Human Development Report of 2011 by the United Nations Development Program (UNDP) states that HDI indicators include life expectancy, expected years of schooling, mean years of schooling as well as income per capita. This shows areas that have to do with the development of the people that the government may be neglecting in its pursuit for advanced ICT.

In concluding this point, it is worth pointing out that Szirmai (2005) provides a reason for believing that developing countries may have to forgo one thing in order to achieve another. Szirmai argues that for a country to be able to invest in capital projects it has to save some national income. According to Szirmai (2005), developed countries achieved this during the "ruthless" capitalism of the 19th century which was characterised by labour exploitation and

low wages. He points out for developing countries to be able to save it call for people living at subsistence level have to postpone present consumption for future investment. Soriano (2007) supports this view held by Szirmai. She states that for example, telecentre investments represent opportunity costs whereby lesser investment is allocated building roads or ensuring food security. This is the reason to believe that countries such as Lesotho, through policies that have developed in the midst of a storm of development ideas, rhetoric and ambiguity, cannot be able to invest in both its human resource as well as capital projects such as ICT infrastructure simultaneously.

4.2.4 ICT-development link

Literature reveals that there is ambiguity between ICT and development. Considering the amount of initiatives, money and publications all resting on the premise that ICT plays an important role in development, it indeed sounds absurd that the link between ICT and development can be questioned. However this is the case. Take for instance Ngwenyamama, Andoh-Baidoo, Bollou and Morawczynski (2006). They state that in 1997 the working group of the United Nations Commission on Science and Technology for Development could not reach firm conclusions about the contribution of ICT. It is worth noting that Ngwenyamama et al. (2006) do point out that the United Nations together with the World Bank, IMF and ITU have been “aggressively” advocating increased investments in ICT for developing countries as well as urging them to invest more of their resources in the course. This shows that it is not unusual for organisations to promote the agenda of ICT4D without evidence that such a connection does produce results. This author is not suggesting that ICT does not contribute to development, but merely pointing out that there is literature which shows there is some ambiguity in the link between ICT and development.

First let it be pointed out why the logic for the link between ICT and development sounds fairly simple. Flor (2001) looks at it from a market standpoint. He states that information has become a primary commodity for participation in the markets. Therefore a deprivation of access to ICT inherently disadvantages one with regards to access to information which is conveyed through ICTs. Avgerou (2008) on the same standpoint as Flor (2001), state that developed countries that better technological innovations enhance their economic which consequently disadvantages less technologically advanced countries. The message is clear, access to technology is necessary for market participation, and indeed development.

Soriano (2007) provides a table that shows an account of two villages in Japan, Menwangzhuang and Pushang. In the table, she shows how some of the information needs of the people of these villages are met at local telecentres. Table 4 below is Soriano's table:

Table 4: Meeting community needs using ICT in Japan

Villagers' livelihood information needs	Telecentre offerings
Market price; product demand	Link to updated market price information and produce/demand information
Agricultural strategies and other possible livelihoods (i.e. For HH members and off farm periods)	Link to agricultural websites/contents, training provided (actual and via experts online and training materials shown in VCR), networking of agricultural techniques across telecentre network
Market strategies for produce (Inability to market produce independently-heavy reliance on local brokers)	Posting of village produce on BBS helped in marketing some produce and in finding buyers, market price info increased farmers negotiating ability with traders
Information on how to access financial capital	Non
Employment information	As venue for social networking. Allows exchange of information on jobs, but no specific content for this
Educational resources for children	Access to educational/research materials, training on web search, venue for youth networking
Health and household management strategies	Health information/advice is available, able to set hospital appointments (but difficulty in searching)
Natural resource management (i.e. prevent future floods, or market village tourist spots)	Tourism strategies available; enabled posting village sites and products in project website

Table 4: How ICT meets community needs in Japan (Soriano, 2007)

Soriano's table shows how investment in an ICT4D initiative can have direct benefits to the community. She also explains that the telecentres draw both young and old as both groups access information relevant to them. The older generation focuses on agriculture, market, and health information, while the younger generation focuses on information pertaining to job opportunities (Soriano, 2007). Another case which might be cited to show a direct link between ICT and development is the Siyakhula Living Labs Project in Dwesa, the project that is discussed in the third chapter of this study. On November 4th 2012 the City Press newspaper published a story about the success of the project. The story features a young lady who learnt computer skills at no cost through the initiative and she states that now she has got useful skill and is indeed employed. The young lady tells her story of how the initiative made a difference for her between unemployment and finding a skilled job. This is just a story of a single individual, through the project computers were installed in one school in 2006 and to date computers have been installed in seventeen schools in the area (City Press, 2012). This author may also argue that it is a characteristic of development itself to have schools that have computers and offer ICT skills. Avgerou (2008) does argue that the presence of technology may in some instances be reward of development, as opposed to it being a tool to bring about development.

Several authors, however, believe that this link between ICT and developmental benefits not clear cut. One such author is Avgerou (2008). Avgerou (2008) assumes an economic standpoint to make his argument and applies Porter's roles of ICT at three different income levels for communities. The lower income level according to this view is characterised by unskilled labour, subsistence land use and trade in basic commodities such as agricultural produce. The middle income level is characterised by a national economy that is integrated into international markets. This level involves importing technologies for industry application. The high level income is characterised by global competitiveness and rapid technology innovation. Avgerou (2008), based on Porter's views, argues that technology has little significance at low income levels where people need basic necessities such as roads, clean water and electricity. The argument here is that the need to communicate or consume information comes secondary to the need to have clean water or desks in schools. Therefore the insistence by donor agencies to push for ICT in communities that are facing such challenges raises questions as to the role that the ICT is to play. Avgerou (2008) argues that the importance and usage of technology is higher at high income levels.

Ngwenyama et al. (2006) support this view expressed by Avgerou (2008). For a start, Ngwenyama et al. (2006) state that in developed countries it has been found that there is a correlation between ICT and positive development indicators. They also explain that there is, however, more research conducted in developed countries than in developing where data remains thin. They argue that even in the absence of data to correlate development and ICT in developing countries, it is evident that there is no correlation. Ngwenyamama et al. (2006) conducted a study to find out if ICT, health and education have any impact on the HDI. In the study, ICT, health and education were treated as individual variables and they conducted a regression analysis whereby they introduced these independent variables one at a time or in any combination simultaneously. Their findings showed that each one of these independent variables has minimal effect on the HDI. On the other hand, a combination of the variable had the most positive effect on the HDI. Ngwenyama et al. (2006) state that the Intelligence Unit warned that ICT is unlikely to deliver on its promises at low income levels as it starts to make an impact as an independent variable after certain threshold of development and innovation capability.

What emerges in the literature is that the potential contribution of ICT to development is well articulated as immense and generally agreed upon by most authors. However, even proponents of this view continue to acknowledge the lack of evidence of direct benefit of ICT to development, particularly in poor communities. This then opens space for ambiguity as to the role that ICT can play in certain circumstances. This is more so because international donor agencies do not address issues of any exceptions, they simply encourage the installation of ICT at all places that need development. Failure to account for any variables that determine the need for ICT is bound to result in failures when it comes to implementation.

4.2.5 Lack of user participation

Walton and Heeks (2011), state that one of the most significant causes of failure in ICT4D is the design-reality gap. A design-reality gap occurs when technology is designed in manner that is not consistent with the requirements to solve a problem (Walton and Heeks, 2011). Thanasankit and Corbitt (2000) say that 45% to 65% of information systems errors originate from design issues. This, they say, accounts for an average of 40% of excess costs of information systems projects. As a result, Thanasankit and Corbitt (2000) state that during

the Systems Development Life Cycle (SDLC), a lot of focus is now given to the early stage of a project, which is the requirements elicitation stage that serves to inform the design of a project. They state that the exercise of gathering requirements must be done meticulously such that analysts must consider small details that users may not consider as important.

Thanasankit and Corbitt (2000) explain that requirements elicitation is the process of discovering, documenting and maintaining a set of requirements for an information system. They state that the user is the one who has knowledge about requirements for the technology and understands the context in which the technology is to be implemented. Walton and Heeks (2011) allege that it is a typical trend in ICT4D for practitioners to not involve beneficiaries and users, at least not to the required extent. They state that a participatory approach in ICT4D initiatives is rare. Other benefits of involving users during the project that Thanasankit and Corbitt (2000) mention include a sense of ownership of the project by the community, learning, faster diffusion and increase the likelihood for its sustainability.

A sense of ownership brings several advantages to a project. Thanasankit and Corbitt (2000) point that one of the problems in requirements elicitation is users may not articulate their needs well or a number of users whose contribution will not reflect the needs of the majority may be willing to participate. They argue that creating a sense that the community has ownership of the project can help mitigate these problems. Their logic is that if the attitude of the community is that the proposed technology is going to be an important part of their lives then that increases the odds that a good number of them will be willing to participate. With increased participation, their input, even if not well articulated, is likely to be reliably informative of their needs as opposed to information gathered from a smaller number of people.

The sentiments expressed by Walton and Heeks (2011) that there is insufficient user involvement in ICT4D initiatives are indicative of why they fail. These sentiments are supported by Thanasankit and Corbitt (2000) in the manner in which they explain the importance of user participation in a project. They even state that the process of acquiring requirements is complex and messy, much less in a business organisation where users may be tracked to participate regardless of their commitment. This therefore shows that with regards to ICT4D, whereby the social context is also least understood, failure is imminent without user participation.

4.2.6 Ignoring local capacities

There are several other causes of ICT4D failure that Walton and Heeks (2011) mention. They include neglecting local institutions and capacities, failure to learn from previous errors and ineffective leadership. They argue that involving local institutions and building local capacities play an important role in the sustainability of the initiatives. They cite the Sustainable Access in Rural India (SARI) project which established numerous telecentres. Walton and Heeks (2011) state that observations of the telecentres revealed that overtime the telecentres that tapped into local capacities survived longer than those that did not. They argue that tapping into local capacities does not just create a sense of ownership, but help to transfer knowledge and develop skills. Heeks (2009) is consistent with the argument that local skills are needed for the survival and sustainability of ICT4D initiatives as states in his 2009 publication titled '*The information society*' that one of the challenges facing underdeveloped countries with regards to ICT is that they lack the skills needed to maintain and improve the technology, as opposed to developed countries.

Parker (2000) writes about closing the digital divide in rural America. He states that in rural America, residents are capable of creating local initiatives to get their needs met. Parker (2000) is referring to both financial and technical capabilities. He states that in the advent of telephones, rural farmers used to set up their own lines because telecommunications companies did not find it profitable to service them. He states that over time the farmers' lines were incorporated into local small telecommunication businesses. Parker (2000) points out that for small rural telecommunications providers in the rural areas who wish to provide a service which it would not be able to fund, the government provides funding. This is to promote the involvement and innovativeness of local capacities. The case of the Siyakhula Living Labs project may be also a good example of involving local institutions. Ranga, Thinyane and Terzoli (2011) reveal that initially infrastructure was located in four schools in the Dwesa area. In November 2012 the City Press reported that there are now 17 schools that are part of the initiative and have computers installed (City Press, 2012). This does not just show sustainability, but it shows that growth as well.

4.2.7 The wrong suspect

One of the things that tend to be considered as one of the factors that contribute to the failure of ICT4D initiatives is costs of users to access the facilities. Because ICT4D initiatives are normally targeted to poor communities in developing countries, it is assumed that costs in the form of user fees may be a deterrent to the use of ICT facilities. Clark and Gomez (2011) conducted an analysis on the role that user fees have on the decision of community members to use ICT facilities in 25 developing countries. Clark and Gomez point out that their analysis only covers public arrears where computers and the Internet can be accessed and exclude private, work or school access as well as mobile phones. They also point out that their analysis covered telcenteres, public libraries, cybercafés and information kiosks. They state that it is important to note the differences between these establishments as they are most relevant with regards to user fees.

Clark and Gomez (2011) state that public libraries normally offer access to users free of charge. Telecentres also offer free access the costs of which are usually covered by a non-governmental organisation (NGO). According to Clark and Gomez (2011), user fees have little significance on whether people choose the use ICT facilities or not. They state that their findings reveal that even distributing a waiver declaring that access is free to telecentres did not increase their use in poor communities. Clark and Gomez (2011) findings show that availing ICT facilities to poor communities does little to influence their usage. Interestingly, it may also be argued that charging a fee for the use of ICTs may not be a deterrent for their use in even in poor communities. Chaudhuri (2012) writes about the proliferation of mobile phones in developing countries including poor rural communities. Using India as an example, Chaudhuri (2012) states that 893.84 million people out of 926.53 million who have phone subscriptions are subscribed to mobile phones. Worthy of note about this, is that unlike telecentres, mobile phone usage is not free (Chaudhuri, 2012).

The analysis conducted by Clark and Gomez produced unexpected findings. Their findings revealed that the knowledge capacity and willingness of venue staff to assist users played a bigger role in influencing people to use ICT facilities. This, it must be said, is consistent with Walton and Heeks' (2011) statement that transferring knowledge and improving local capacities is important to ensure sustainability. Clark and Gomez (2011) reveal that calibre of staff is proven to be more influential than the content provided. They explain that in some

countries where English is not widely spoken, content in native languages may be an issue. Clark and Gomez (2011) do however reveal one cost that they say has resulted in the demise of many telecentres. These are the costs to run and maintain the telecentres. They point out that in most cases once funds dry up from the sponsor of a telecentre it usually shuts down as a result of being unsustainable from a financial point view.

4.2.8 Lack of proper project management

Among the things that Walton and Heeks (2011) consider to be the root causes for ICT4D failure is a lack of proper project management. They state for a project to succeed effective project management is required. Pade (2006) state that appropriate project management improves the potential for a project to make the desired impact and may ensure its sustainability. Pade (2006) cites the Project Management Institute (PMI) which defines project management as the application of knowledge, skills, too and techniques to project activities to meet project requirements. She explains that the application of project management skills allows for a holistic systematic approach to project development which is essential in capturing and understanding the context in which the project is to be implemented. Walton and Heeks (2011) decry that this essential service of project management when it comes to social development project is not accorded the level of importance it deserves.

4.3 Conclusion

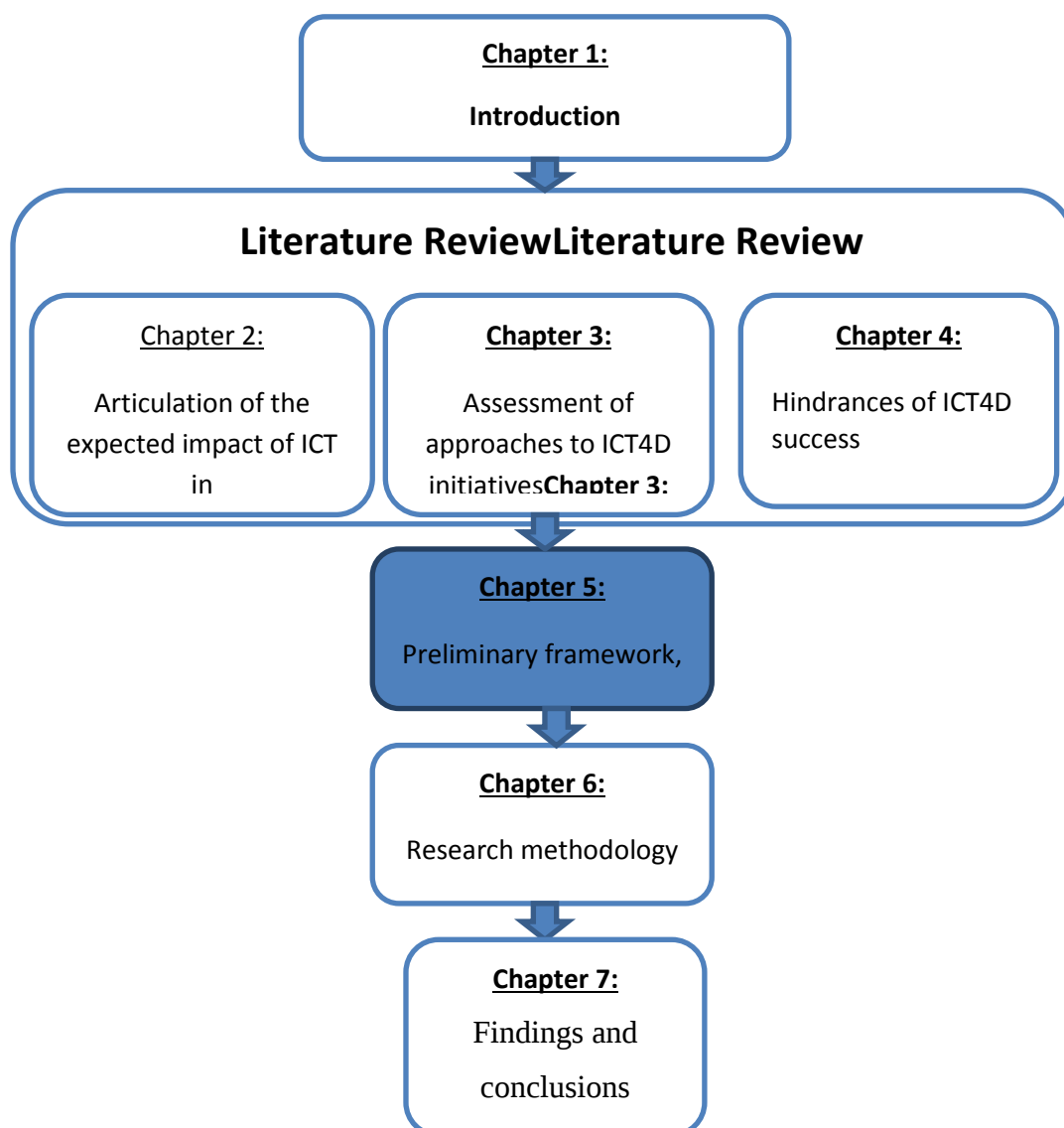
This study shows that there are several different reasons for which ICT4D projects fail developing countries. Usman and Said (2012) and Galperin (2010) attribute some of the failure to poor policies. Galperin (2010) believes that the erroneous thinking that achieving connectivity would lead to development through ICT has led developing countries to formulate bad policies. Galperin (2010) argues that there is no historical evidence that developed countries achieve their success in any uniform manner, as this kind of thinking propositions that ICT4D be undertaken in that manner. Usman and Said (2012) think ambiguity is prevalent in policy statements in developing countries and thus make it difficult to execute them.

Heeks (2009) and Wertlen (2008) argue that the hype around ICT4D is on the causes of failure. Heeks (2009) observes that ICT delivered resounding success in business and it was

then believed it could have a similar effect in development without any evidence to support this belief. Heeks (2009) also believes that ICT4D got its legitimacy when it was prescribed by the UN as a delivery mechanism for the MDGs. Heeks argues that this created high expectations without evidence of real success. Wertlen (2008) believes that the hype also emanate from increasing of ICT by humans, which shows a trend that modes of production in the future will increasingly require information resources.

Other reasons for failure pointed out author include the lack of a framework to link ICT with development (Avgerou, 2008). Ngwenyama et al. (2006) state that research has been unable to find concrete evidence to link ICT and development, instead there are positive indicators of the relationship between ICT and development. This is problematic because large investments as well as the hope for lifting millions of people out of poverty is based on the premise that ICTs are tools that will bring rapid development in underdeveloped nations. The absence of this link is also problematic because it remains unknown how to use ICTs effectively in order to bring about development. Lack of user participation is discussed by Walton and Heeks (2011) as one of the main causes of ICT4D failure. They argue that technological solutions are brought into communities without allowing community members to articulate their needs first. This creates a discrepancy between what the technology can do and what the community needs, which they call a design-reality gap. Lastly, Walton and Heeks (2011) state that ignoring local capacities is another one of the hindrances of ICT4D success. They argue that project such as the SARI which tapped into local capacities showed a high success rate. There is a need to create a framework or some guiding principles to country these hindrances. The following chapter discusses a possible framework.

5. Chapter 5: Preliminary framework



5.1 Introduction

The objective of this study, as articulated in the first chapter, is to produce a framework that can be used to guide the implementation of ICT in developmental endeavours of rural areas in South Africa. Ashraf, Hanisch and Swatman (2008), state that there are other frameworks available that are designed to serve a similar purpose. However, they point out an important challenge posed by the application of any such frameworks in different environments. They argue that the relevance of a framework designed for one particular context is questionable in a different environment where the context is different. For example, Rao (2007) proposes a framework for implementing ICT in agricultural development in India. Rao points out that even within India, each different area should be assessed to identify its appropriate ICT4D strategy. He argues that required technologies may differ from area to area as well as institutional and policy initiatives. With such assertions by Rao, it can be argued that ICT-agricultural implementation framework that he proposes is not applicable in South African without proper assessment as it is a totally different context. It is for this reason that it is important for research, such as this one, to produce frameworks that are designed for the South African rural context.

Cadenasso, Pickett, and Grove (2006) define a framework as a theoretical concept that articulates what systems and processes are included under that theoretical concept. The Cambridge University Press (2011) defines a framework as a system of rules, ideas or beliefs that is used to plan or decide something or a supporting structure around which something can be built. In order to understand the concept of a framework, it is the view of this researcher that it would be helpful to contrast a framework against a model. A model, as defined by the Cambridge University Press (2011), is a representation of something, either as a physical object which is usually smaller than the real object, or as a simple description of the object which might be used in calculations. Taking into account the descriptions of these two constructs, it can be stated in simpler terms that a framework is a skeleton which explains what the design of a concept should entail, whereas a model is a completed representation of a design concept in a smaller scale.

The framework proposed in this chapter is informed by the theoretical study that has been conducted through the previous chapters. In addition to information gathered in the literature review chapters, several frameworks are going to be examined in order to some

underlying ideas that they have in common. However, this is not the final framework. The final framework will be one that has been refined according to empirical evidence gathered by interviewing some stakeholders who have been involved in ICT4D initiatives in the rural areas specified in the first chapter. The final refined framework will be the artefact that this study aims to produce and contribute to the body knowledge.

5.2 Towards a conceptual framework for understanding developing countries

Ashraf, Hanisch and Swatman (2008) discuss a framework that they propose for the use of understanding ICT4D projects in developing countries. The diagram illustrating this framework is shown in appendix 1. Their framework is specifically aimed at evaluating the impact of ICT4D projects in developing countries. They start by pointing out that ICT4D frameworks tend to focus mainly on implementation and less on the resulting impact. Their framework aims to close this gap. Ashraf et al. (2008) have a good reason to want to close this gap. Stories of ICT4D failure are not in short supply in the literature of this field. Authors such as Heeks (2009), Bailur (2007), and Harindranath and Sein (2007) all highlight that ICT has not delivered as promised in the domain of development. However, authors such as Ashraf et al. (2008) put forward the argument that ICT4D has not entirely been a failure. They believe that even if initially stipulated goals of a project may not be achieved at the end of most ICT4D projects, there often are partial success or other positive outcomes that may not have been intended as primary goals.

Ashraf et al. (2008) argue that ICT4D should not only be measured by functions that are easily identifiable and could be carried out using ICT such as tracking disease outbreaks, but it should also be considered as social progress that more households in developing countries have access to voice and text transmitting devices in their own homes through the individual ownership of mobile phones. Even though people find mobile phones useful for their day to day activities which may not necessarily fall within the scope of ICT4D project goals, the assimilation and utilisation of the technology has a positive impact in the lives of people in developing countries. It is for this reason that Ashraf et al. (2008) present a framework to help understand the impact of ICT4D project in developing countries. In the process of developing a framework for this study, it is important not to ignore this view. It would lead

to a distorted framework if the approach is that ICT4D is mostly a total failure when there are positive outcomes that are being ignored.

Ashraf et al. (2008) discuss another factor that they believe should form the backbone of any ICT4D framework. This factor is context. They point out that this is not just their view, but that ICT4D puts a great emphasis on both local context and content. Van Reijswoud (2009) discusses appropriate ICT tools in order to improve the effectiveness of ICT4D. Van Reijswoud states from the onset that the goal of his paper is to present a hypothesis which states that ICT4D will be successful only when projects are adapted to local conditions. Both Ashraf and Van Reijswoud point it out that literature pertaining to successful ICT in the development domain is mostly based on developed countries, and that their frameworks and models not transferrable to developing countries. Heeks (2009) states that there needs to be a new view of the world's poor and there should be new approached to innovation and implementation of solutions.

The literature published by these authors shows that without appropriately understanding the context in which an ICT4D project is carried out, the chances of success depreciate. This literature suggests that what is learnt from the success of other projects must not be given priority over a proper analysis and understanding of the specific conditions and context of the area in which a project is to be carried out. This is a view that this study will take into serious consideration when developing a framework. ICT4D literature, as already shown, makes a strong suggestion for ICT4D project stakeholders to capture the context correctly. This view can also be supported by literature from authors such as Heeks (2009) who posit that the participation of local communities in ICT4D projects is crucial for success. This is because the participation local populations enables for the local conditions and context to be captured effectively because local populations are the best source of information regarding their area.

There is another aspect of ICT4D which Ashraf et al. (2008) discuss. It is the economic aspect of an ICT4D project. They are quick to point out that ICT4D interventions go beyond economic factors. They state that there are other aspects of society that ICT4D contributes to such as political, health and social. They argue that in the development of an ICT4D framework it must be understood that ICT4D is complex. Even though a project may be primarily aimed at achieving other goals besides economic or financial gain, Ashraf et al. (2008) argue that all ICT4D projects have an economic aspect that must be paid attention to.

They argue that both the feasibility and sustainability of a project is to a great extent dependent on its economic viability. Hickey and Mohan (2003), state that most developmental projects involving ICT are funded by donor agencies such as the United Nations. Heeks (2009) asserts that one of the causes of failure of ICT4D is that there is often no plan in place to sustain projects once the donors who were funding them have left. It is evident from this literature that the financial viability or economic aspect of a project must be taken into consideration even if the project is not aimed at generating income. Ashraf et al. (2008) supports this view, reiterating that even if the primary goal of an ICT4D project is not to bring about economic or financial growth, a plan must be put in place as to how the project will generate revenue, at least to cover running costs and maintenance.

5.3 A dynamic framework to guide the implementation and evaluation of educational technologies

In their paper, Melle, Cimellaro and Shulha (2003) discuss producing a framework to guide the implementation and evaluation of educational technologies. It is worth noting that they only discuss information and communication technologies. In their discussion, Melle et al. (2003) start out by explaining that implementing ICT in education involved a myriad of complex variables. This assertion is consistent with views expressed by other authors. In his 2009 paper titled ‘The ICT4D 2.0 Manifesto’ Heeks addresses the complexity of the use of ICT in all developmental aspects. Hameed (2006) points out an even more fundamental problem, stating that the link between ICT and development is not clearly understood to start with. Even with the narrow scope of education with regards to ICT4D, Melle et al. (2003) state that literature does not provide proof that ICT enhances education. This view put forward by Melle et al. are consistent with Ashraf et al. (2008) view that researchers who want to develop a framework should be aware of the complex nature of ICT4D.

By first explaining that ICT is complex, Melle et al. are trying to make the argument that context is crucial when developing a framework. They state that the application of ICT is dependent upon the context of the school. According to Melle et al. schools have different priorities, challenges and resources. Indeed a similar argument regarding context is expressed by Rao (2006). Rao discusses a framework for the implementation of ICT in agriculture in India. He argues that a framework used in one village is not necessarily application in another village. Ashraf et al. (2008) also argues that the frameworks used in

developed countries are not transferrable to developing countries. The arguments made by these authors show that if a framework is not tailored to the context of the particular area in which it is to be applied, the project is most likely to fail to meet its goals. To add to the complexity of ICT4D, Melle et al. state that ICT has a wide array of applications in development. This means it can be applied in many domains in different ways. Melle et al. state that this makes it difficult to develop a set of best practices that can form the backbone of a generic framework.

Melle et al. (2003) expand their argument regarding the development of a framework. They argue that it does not necessarily mean that every school should develop its own framework even if their contexts may be judged as different. They introduce the concept of a ‘dynamic framework’. According to Melle et al. (2003) a dynamic framework is a framework that is applicable in different context but is designed in a way that it is responsive to complexities. Melle et al. (2003) invoke the same argument as Ashraf et al. (2008), stating that stakeholders should not necessarily expect success in the form of strict achievement of goals that were stipulated in the inception of a project. Melle et al. (2003) argue that various degrees and types of successes can be achieved even without the ideal conditions. Ideal conditions, as suggested by Melle et al. (2003), are achieved when the context is well understood and all resources are available. However, they argue that varying levels of success can be achieved if the framework used is dynamic to account for complexities.

Support from this argument can be obtained from Ashraf et al. (2008) who make the example that in developing countries when the frameworks that were used in economically wealthy areas were applied in less economically wealthy areas within those same countries, they achieved some level of success, albeit limited. This is because even though the context between an economically wealthy area and not so wealthy is different, stakeholders there have been able to account for some complexities that are emerge in these different areas. Melle et al. state that a dynamic framework is one that focuses on a limited scope of goals but is open to opportunities and challenges that may not have been recognised in the beginning, does not depend on optimal conditions, is applicable to slightly different contexts and responds to on-going complexities, and allows for creativity. In short, this is a framework that allows for flexibility.

Melle et al. (2003) also discuss sustainability. They define sustainability as the ability to maintain a project over a long term. Bailur (2007) identifies factors affecting sustainability as financial, social, institutional, technological, and environmental. Melle et al. state that there are three reasons why the issue of sustainability must be taken into consideration. Firstly, they state that the structural requirements of projects require long term timelines. They point out that most ICT4D projects are linked to a larger reform programme. For example, when Rao (2006) discusses ICT in agriculture in India, it can be seen that ICT is one part of a larger agricultural programme. Secondly, they state that there are no ICT projects that aim for short term impact. They argue that development itself is a long term endeavour. Thirdly, they argue that the success of ICT4D can only accurately be measured through long term systematic outcomes. Melle et al. assert that sustainability is one of the most important conditions for a successful ICT4D initiative.

5.4 A framework for implementing ICT in agricultural development in India

Rao (2007) discusses a framework for implementing ICT in agricultural development in India. Rao first states that agriculture and ICT need to be intertwined because every activity in agriculture involves the creation, processing and communication of information. He explains that successful farming is dependent on decisions which necessitate adequate and relevant information. Rao mentions two factors that he identifies as the twin concerns of agriculture in the 21st century. These, according to Rao, are raising rural incomes and ensuring long-term sustainability of its natural resources. Considering that agriculture employs about 56.7% of India's workforce (Rao, 2007), this means that a sound framework for engaging ICT in agriculture very important.

The first point that Rao makes is that there is a need for the framework to ensure that ICTs will help increase financial gain for rural farmers. An argument supported by Ashraf et al. (2008) has already been used above to explain that it is not always the general aim of ICT4D to generate. However, it must be pointed out that in this particular scenario that is presented by Rao (2008), generation of income through agriculture is one of the main goals. This argument is supported by the statistics regarding the number of people who are dependent on agriculture in India as well as other developing countries. Rao (2008), states that 56.7% of India's population is employed in the agricultural sector. This speaks to the importance of

income generation in both subsistence and commercial agriculture. Ashraf et al. (2008), state that ICT4D projects should at least produce enough revenue to cater for running costs. Rao (2008) also concurs with this view. Rao (2008) explains that in India, several profit driven organisations cater for the running costs of infrastructure as their businesses generate profits from the use of ICT facilities. For instance, Rao (2008) makes an example about ITC's e-Choupals. ITC is a private company that installs computers with broadband Internet connection in rural areas called e-Choupals. These computers allow farmers to sell their produce directly to ITC at prevailing market prices. They also enable them to bypass purchasing agents.

Rao (2008) also discusses context with regards to the ICT4D initiatives. Rao (2008) starts by pointing out that ICT has been successful in the agricultural sector in developed countries. He outlines the characteristics that form the context of ICT4D in developed countries. These characteristics include high literacy rates, well developed communications infrastructure, good roads, availability of reliable electricity, transportation and markets, adequate scope of value addition to processed foods, and easy access to ICTs in a supportive policy environment. The context described by Rao (2008) regarding developed countries is consistent with that discussed by Parker (2000) regarding ICT in rural America. Parker (2000) states that people in rural America have the capability to initiate their own solutions, which shows their literacy levels. Parker (2000) continues and states that they typically have local telecommunications companies, television stations and electricity providers. Rao (2008), states that in developing countries, the context is typically different and often characterised by poverty and lack of infrastructure.

Melle et al. (2003) argues that for ICT4D to be successful in developing countries, it is not necessary to meet all the conditions as observed in the contexts of developing countries. They argue that the success of ICT4D in developing countries will not depend on the ideal conditions such as good roads and robust ICT infrastructure, but will depend on proper understanding of the local context. To substantiate this argument, the case of Rwanda may be used. On a CNN (2012) bulletin, reporter Richard Quest looks at the ICT ambitions and progress of Rwanda. In the bulletin, Quest talks about a mobile phone application that is used by farmers and agricultural produce vendors to find out market prices without leaving their locations. To note about this application is that it does not require a sophisticated 3G enabled phone. It requires a basic mobile phone that can send and receive an SMS. Farmers

and vendors only have to type the name of the product and SMS it to 7656, after which they receive an SMS response containing the price of that product. Indeed, the conditions are not ideal as Quest points out that the country is mainly rural and much of the people lack basic services.

This case however proves that ICT can play a significant role even in a place where the conditions are less than ideal in comparison to other contexts such as developed countries. Rao (2006) discusses several aspects of ICT initiatives such as infrastructure and services provided. In his discussion he analyses e-Choupals and i-Community, both in India. The e-Choupals are run by the private company ITC while i-Community is run by Hewlett Packard (Rao, 2006). Among the aspects of ICT4D initiatives that Rao (2006) discusses is sustainability. This is worth noting because the other cases that have been discussed in this section also address the importance of sustainability of ICT4D initiatives. It is an indication that it is important for a framework to account for means of sustainability. Rao (2006) states that sustainability is an integral part of ITCs overall competitive agribusiness strategy. For Hewlett Packard, Rao (2006) states that it is part of their long term global business strategy for emerging markets.

5.5 Literature review from previous chapters

In the literature review of this study, publications by other authors were studied to determine the role that ICT plays in development as well as the factors that hinder the success of ICT4D. The findings from chapter 2, 3 and 4 are meant to answer the question that this study seeks to provide an answer to, which is ‘how can the design and implementation of developmental ICT interventions be improved in order to achieve the desired impact of ICT4D’? The findings from those sections, together with the information gathered from other frameworks as articulated above in this chapter, will serve to inform the framework that is proposed in this chapter. As already mentioned, the proposed framework in this chapter is not the final artefact as it is based on theory. Empirical data will be collected through interviews in order to inform the final framework.

In chapter 2 of this study, the role that ICT is supposed to play in development is investigated. This study posits that the role that ICT is to play can be determined by studying

the goals of development. Wertlen (2008), states that ICTs are a means for reaching out to communities. Harris and Rajora (2003) state that ICTs are tools to fulfil development goals while Heeks (2009) states that ICTs are a delivery mechanism for development. These assertions show that the role that ICT plays is determined by the goal that is to be achieved. To give an example, if one needs to frequently speak to other people who are far away, then a telecommunication technology such as a telephone or a mobile phone may be purchased because of the functionality of these technologies which enables them to play the role of a medium for talking over long distances. On the other hand, if one's goal is to produce documentation such as business plans, curriculum vitae and proposals, purchasing an information technology such as a computer may be most appropriate because of its functionality which enables it to play the role of information processing and document production. The answer derived from this section is that the role that ICT plays is determined by the goals to be achieved. Therefore this study posits that a framework for successful implementation of ICT4D must point it out to the user that clear goal determination is critical for success.

In chapter 3, Walton and Heeks (2011) propose what they call a “process approach framework” to ICT4D implementation. They are proposing this framework as an alternative to the ‘top-down’ approach. The reason Walton and Heeks propose this framework is because they argue that goal determination in ICT4D initiatives fails because the ‘top-down’ approach is often used. They define the top down approach as an approach to development whereby ideas flow from outsider stakeholders such as sponsors and researchers into the communities in which development initiatives are being carried out. They argue that the participation of users or community members during goal determination and project design is often limited which leads to ‘design-reality gaps’. A design-reality gap may be described as a situation in which a proposed technology solution does not correspond with the problem that it seeks to solve (Walton and Heeks, 2011). Thanasankit and Corbitt (2000) say that 45% to 65% of information systems errors originate from design issues, and this is in a company environment where a system development life cycle that provides for joint application development with users is followed. This information reveals the scale of the problem with regards stakeholder participation, particularly community members. The lesson derived from this chapter is that the proposed framework must address this issue.

Another issue addressed in chapter 3 that can be deemed as noteworthy is that of policies. Torjman (2005) defines a policy as a deliberate and careful decision that provides guidance for addressing selected public concerns. Indeed, in 2012 the South African Department of Communications held a National ICT Policy Colloquium in Cape Town. Editor Jon Tullett of the online news provider IT-WEB reported that the research manager of IDC Government Insights Middle East, Turkey, and Africa stated that without a policy, South Africa would be “worse” than previous years (Tullett, 2012). Galperin (2010) argues that failure of ICT4D in developing countries is closely linked to their poor policies regarding ICT. On a government news website, South Africa’s Communications Minister Dina Pule states that ICT policies must be aligned with the government’s developmental goals (SANews.co.za, 2012). This shows that the ICT policy issue is also a developmental issue that ICT4D stakeholders should be aware of. The framework should ensure therefore to bring it to the attention of stakeholders.

In chapter 4 this study discusses hindrances that impede the success of ICT4D. Bailur (2007), states that billions of dollars have been spent on ICT4D initiatives, which shows the extent to which ICT4D has been attempted. Chaudhuri (2012), states that there are 140 telecentres across South Africa while there are a lot more of them in India. Melle et al. (2003) argues that the sustainability of a project is a condition that is critical to fulfil because the success of a project depends on its continuity. Chapter 4 reveals that the factors that lead to the failure of ICT4D projects are interconnected. For instance, ambiguity as to the meaning of development is discussed. Thomas (2004) discusses the subject of development and points that there is no agreed upon definition of what development is. This poses a problem as several stakeholders working on a single ICT4D project may not hold the same view of the development that they are trying to achieve. Another factor that is discussed in this chapter is the link between ICT and development. Authors such as Soriano (2007) and Hameed (2006) argue that the link between ICT and development is not clearly understood and argue that literature has neither articulated the link between the two nor provided evidence that there has been success in coupling development with ICT. This shows the problem of the understanding of the interconnectedness between defining development and linking development to ICT.

Several other factors that lead to the failure of ICT are discussed in this chapter, and it should be noted that they are not isolated. These include failure to both acknowledge and develop

local capacities, lack of user participation, poor analysis of local context, as well as policies that are not supportive to ICT dissemination. In this chapter, the study gathered that introducing project management to ICT4D may help curb some of the problems. Pade (2006) argues that the application of project management skills allows for a holistic and systematic approach to project development. As it has been shown that the problems that hinder the success of ICT4D are not isolated, a holistic approach may be regarded as a good solution. Good project management practices allow for complexities to be accounted for in a project and allows for mitigation strategies to be developed.

With the help of the above literature, this study proposes a framework that can be used to guide the implementation of ICT4D projects and thus achieve desired impact. The framework takes into account the recurring themes in the views expressed by the authors such as financial viability and sustainability, as well as the factors that have been pointed out by some authors as critical such as project management. Figure 2 shows the proposed framework.

Figure 2: Preliminary framework

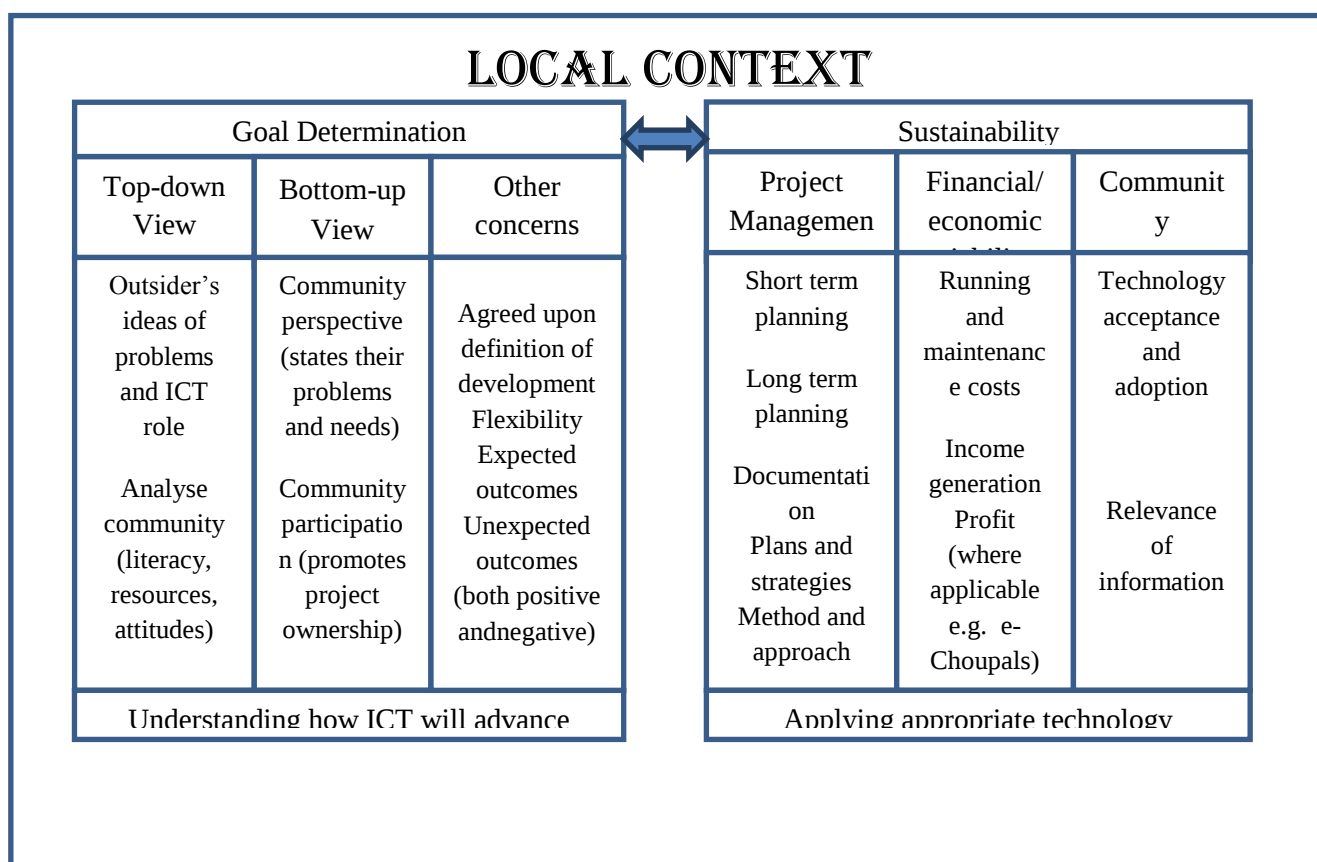


Figure 2: Preliminary framework

5.6 Explanation of framework

The framework shows two bold statements that are within the main boundary. The statements read; Local Context and Supportive Policy Environment. The literature in this chapter has shown that understanding the context in which an ICT4D initiative must be recognised as a precondition for all other tasks to place. This single factor determines the relevance of the whole project in a particular community. Literature also shows that without an ICT policy that is focused on development, ICT4D success will continue to be elusive. These two factors as gathered in this literature form the background for a successful ICT4D initiative.

The study revealed that the role that ICT needs to play in development can be determined by identifying the developmental goals that are aimed for. Understanding what goals need to be achieved helps to then determine how ICT can assist in that. In other words, as shown in the model and articulated in the study, goal determination helps stakeholders to understand how ICT can advance development. It has been established from the literature that the top-down approach to ICT project is problematic as it tends to underplay the views of local communities. The model proposes that the top-down approach is not discarded, but in addition to it a bottom-up approach must be taken as well with a balance between the two. A bottom-up approach give the perspectives of local communities a priority, however literature also shows that sometimes rural community members may not be able to effectively articulate their perspectives or know what technology solutions are available. This is the reason that the bottom-up approach is useful to retain.

There other important concerns that literature has shown that are important not ignore in ICT4D. These include a working definition of development. It has been shown that development is a broad subject. It has also been shown that ICT4D initiatives typically involved cooperation between multiple stakeholders. This framework proposes that there should be an agreed up definition of development in order to determine the scope of the project. This also makes it easier to articulate milestones and expected outcomes.

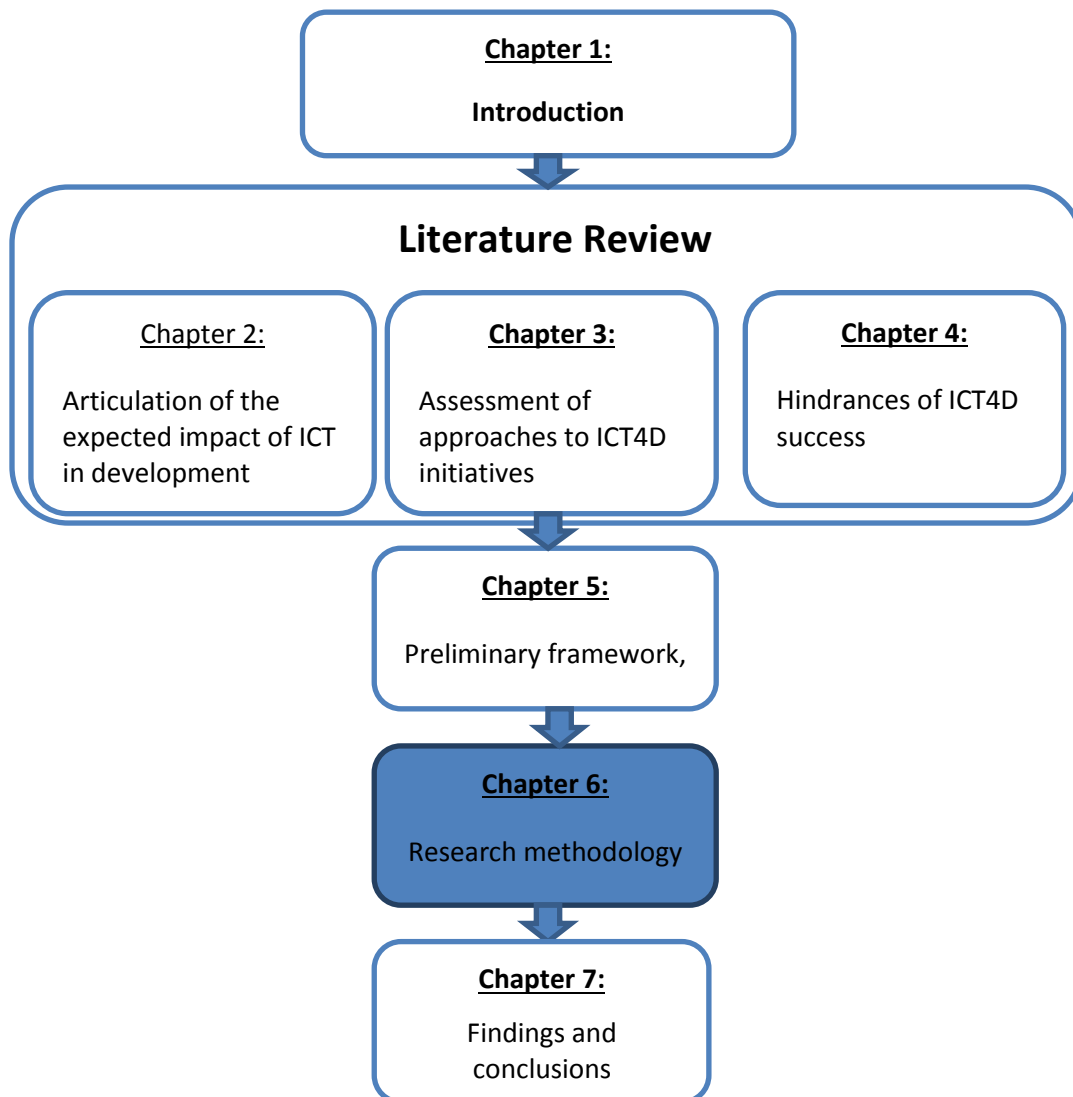
The other main component of the framework is concerned with sustainability. Although sustainability is a broad topic on its own, the study has shown that it must not be ignored. Literature shows that even though an ICT4D project may be well designed and on track to achieve its, when donors stop funding that project there is no way to salvage it unless a plan

to sustain the project is put in place. It must be noted that an ICT initiative can only succeed if it runs for as long as it is necessary for it to run. The framework shows that the major ways to keep an ICT4D initiative going is to apply project management skills, to plan for its financial sustenance and to get the community to be a part of the initiative.

5.7 Conclusion

This chapter set out to produce a preliminary framework for implementing ICT4D projects successfully in rural areas in South Africa. The study found that it is important to understand the context of rural South Africa as well as for the country to have a policy that is geared to foster development through ICT. It has been revealed in the study that indeed national ICT policy is a developmental concern. The study can also conclude that the top-down approach does not paint a holistic picture of the needs of rural communities. It is suggested in the model that this can be mitigated by finding a balance between the top-down approach and the bottom-up approach. In this way local perspectives are captured while outside expertise is also taken advantage of. The framework produced in chapter shows that sustainability issues are critical. In order to ensure sustainability, the framework suggests project management approaches to be used, the financial sustenance of an initiative be planned ahead and the local communities should always be a part of the initiative.

6. Chapter 6: Research methodology



2.1 Introduction

This chapter articulates how this research is carried out. The researcher utilised Robert Yin's guidelines on how to conduct case study research. Using this guideline, the researcher explains what kind of case study strategy was employed in the study and why. In this chapter, the research design is detailed. The researcher briefly goes over the research sub-questions that are also discussed in chapter 1, as well as the problem statement and the theory that forms the background of this study. Furthermore, the factors that ensure that a study is of good quality are discussed with regards to how this study conforms to them. These factors are identified by Yin (2003) as internal validity, external validity, construct validity and reliability. To begin the chapter, the research design is discussed first.

Figure 3: Research design

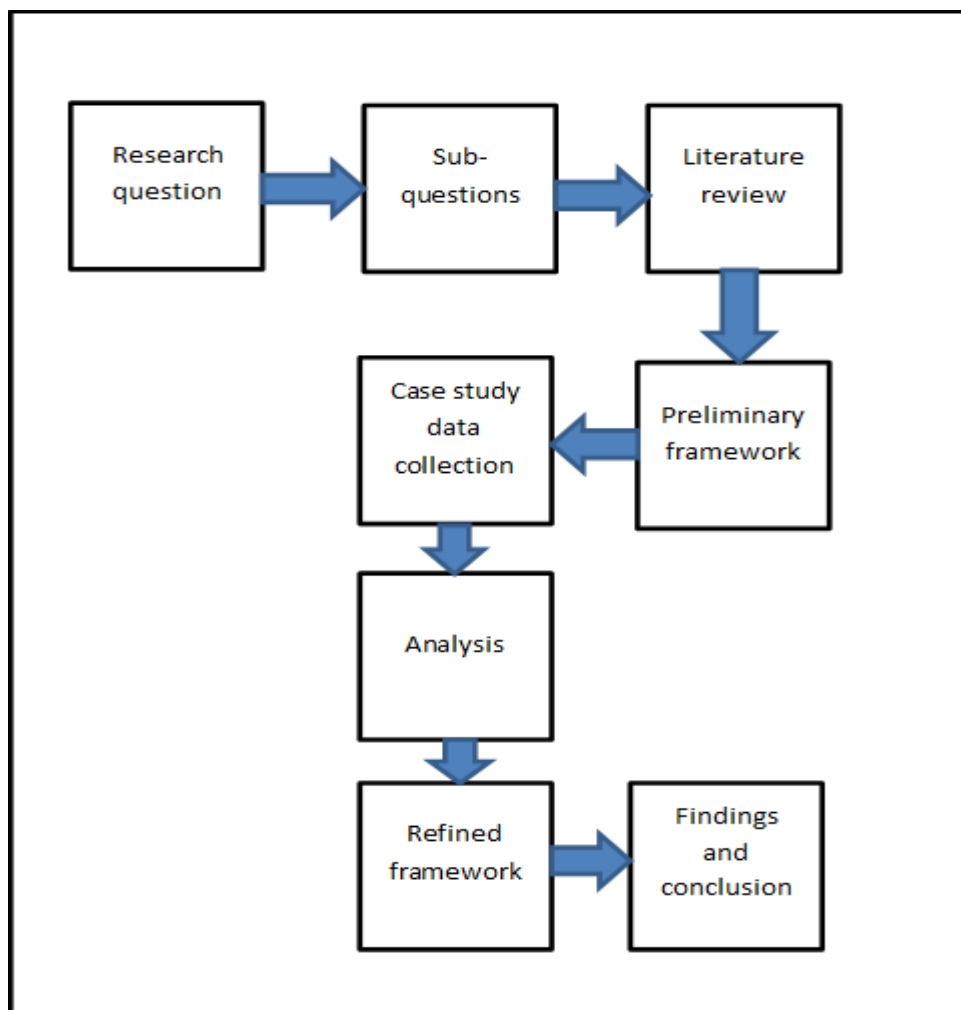


Figure 3: Research design

6.2 Research design

When writing about research designs, Yin (2003) states that every empirical study does have an implicit, if not explicit research design. Yin explains why a research design is important. He points out that a research design ensures that the evidence gathered during a study addresses the research question. The design provides the logical link between data and the question. In order to provide answers to the question posed in this study, the case study research design is used. Yin is quick to point out that previously the case study design was considered a subset of another research strategy. However, Yin reassures that the case study strategy is acceptable as an adequate research design strategy on its own. Creswell (2009) states that a case study is considered a strategy of inquiry.

Creswell (2009) articulates the relationship between case studies and qualitative research. He states that case study research involved the study of an issue explored through one or more cases within a system. Creswell, states that for instance, a case study allows for inductive data analysis in qualitative studies through pattern building from themes that can be identified between cases. The details of the case study design used in study will be discussed in detail later. At this point, this research is going to illustrate by use of diagram design of the research. In this chapter, the researcher explains why the case study strategy was chosen to carry out the empirical research. The researcher also explains how this research achieves internal validity, external validity, construct validity and reliability.

6.3 Research paradigm

This study leans towards a phenomenologist ontological position. It is an interpretive qualitative study. Although Collins and Hussey (2003) states that researchers seldom strictly apply a specific paradigm, this researcher will learn much closer to the phenomenologist extreme, making the study a fully interpretive study based on qualitative analysis of empirical data. Collins and Hussey (2003) provide a diagram which shows the continuum of ontological assumptions in order to illustrate the two extreme ontological positions and what they entail. As shown in Collins and Hussey's diagram below, this researcher views reality as both a human construct as well as as the projection of human imagination. This research conducts an empirical research by the use of the interview instrument and analyses data according to the statements made by the interviewees. In order to interpret the data correctly,

it is critical that the researcher understands and captures reality according to the perspective from which the interviewees project it.

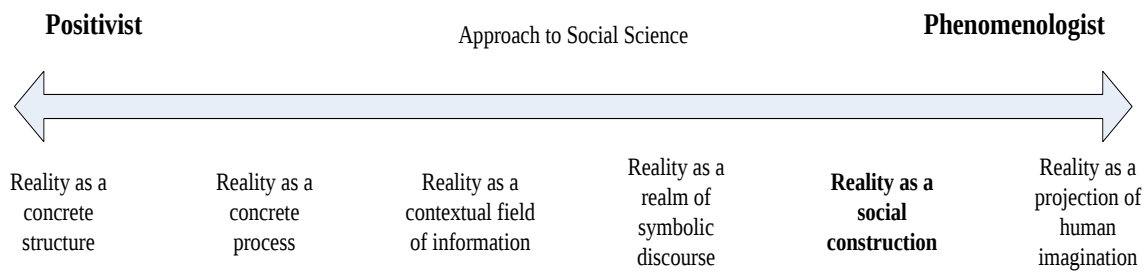


Figure 4: Continuum of Core Ontological Assumptions (Collins and Hussey, 2003)

6.4 Research questions

The research question presents the challenge that this researcher seeks to solve. The research question is posed in chapter 1 of the study. In order to manage the research question and ensure that every aspect of it is addressed, there are sub-questions that are also posed in chapter 1. The sub-questions read as follows:

Main: Research question: How can the design and implementation of developmental ICT interventions be improved in order achieve the desired impact of ICT4D?

1. How can ICT interventions advance development?
2. How are ICT interventions currently undertaken?
3. What is hindering ICT4D from having the expected impact?
4. What needs to be done in terms of design and implementation of ICT4D initiatives in order to achieve the desired impact?

The purpose of these questions is to guide the research towards finding answers that satisfy the overall research question. The specific information that these sub-questions seek to provide is articulated in chapter 1 where they are introduced. Each of these questions is addressed in an individual chapter. In other words, each sub-question is made into the subject of its own chapter in whereby literature is explored to find answers. This part of the study is called a literature review and provides data gathered from the views of other authors. The secondary data collected from this phase used to formulate a preliminary answer to the main question of the study through the development of a framework. It must be noted that

the final answer to the research question is a framework that has been refined based on primary data or empirical evidence that is collected from a specified sample population using interviews as an instrument.

6.5 Problem statement

Literature shows that most ICT4D projects fail to achieve their goals in helping to advance development (Heeks, 2002). Bailur (2007) argues that this is not merely because of the lack of ICT infrastructure as billions of US Dollars have been invested in infrastructure already with no success to show for. He argues that the problem lies with the method, or lack thereof in the implementation of ICT in development projects. Thomas (2004) concurs with this view by stating that there is lack of theoretical frameworks to link development with ICT. Although there are some frameworks for implementing ICT such as one cited by Gichoya (2006) as being used by the British government, the problem that this study addresses is that there is no framework that literature provides that is suitable to guide the introduction and use of ICT in South African rural areas

6.6 Underlying theories

6.6.1 Diffusion of Innovations Theory

In order to be able to produce a viable framework, there is a need for this study to make a plausible proposal as to how technology could be diffused and used by members of society. This study will follow the guidance of the diffusion of innovations theory to gain understanding of the dynamics of acceptance and penetration of innovations and ideas into society. Diffusion of innovations theory is a theory described by Rogers (1995) as the process by which innovations are communicated over time among members of a social system (Hornor, 2007). Narayanan and O'Connor (2010) define diffusion of innovations as the process by which an innovation is spread within a market or social system over time amongst various categories of adopters. The diffusion of innovation theory posits that there are five basic groups of people within the same social system that respond to new innovations differently. Quoting Rogers (1983), Hornor (2007) writes that the groups are categorised groups as; innovators, early adopters, early majority, late majority, and laggards.

Innovators are said to adopt innovation very quickly and are described as risk takers, financially secure and able to understand and apply technical knowledge. Early adopters are also characterised by their speed of adoption of innovations, level of success, and status as role frameworks. The early majority can be described as group that interacts frequently with peers and deliberate before adopting new ideas. The late majority is described as the group adopts new ideas late, yield to pressure from peers, may adopt new ideas as an economic necessity, and tend to be sceptical and cautious. Lastly, it is the laggards. Laggards have limited resources, are isolated and a take the longest time to adopt new innovations, if at all. The diffusion of innovations theory is concerned with the aggregate of penetration of innovations across all these categories of people within the same social system (Narayanan and O'Connor, 2010).

According to Hornor (2007) this is where diffusion of innovations differs from adoption of innovations. Hornor (2007) explains that while diffusion is concerned with the process by which innovations become widespread within a social groups, adoption pertains to individuals' attitude towards acceptance and use of innovations. If the diffusion of ICT is successful within a community, Heeks (2009) suggests that people would use it to empower themselves and thus increasing the chances of ICT making a positive impact in development.

6.7 Empirical study

Empirical research is carried out using the case study research strategy. Yin (2003) points out that there are five major research strategies that a researcher might choose. These are experiments, surveys, archival analysis, histories, and case studies. Yin explains that there is not strategy that may be considered superior among these. He states that the choice of a strategy should be made according to which one is most suitable for that particular study. Yin provides three conditions that a research should take into consideration when choosing a research strategy. The table below is provided by Yin to illustrate these conditions.

Table 5: How to choose a research strategy

Strategy	Form of research question	Requires control of behavioural events?	Focuses on contemporary events?

Experiment	How, why?	Yes	Yes
Survey	Who, what, where, how many, how much?	No	Yes
Archival Analysis	Who, what, where, how much, how many?	No	Yes/No
History	How, why?	No	No
Case Study	How, why?	No	Yes

Table 5: Choosing a Case Study Strategy (Yin, 2003)

The information as provided by Yin in the table above was used to decide on a case study as the most suitable research strategy for this study. The researcher is asking a “how” question, has no control over behavioural events and is focusing on contemporary events. Yin (2003), states that the case study research strategy should not be confused with “qualitative research”. However, argues that the case study strategy is suitable for conducting qualitative research. He also points that it could also be used for quantitative studies. These views expressed by Yin are supported by authors Creswell (2009) and Stake (1995).

6.8 Choosing a multiple case study

Choosing to use the case study design strategy is not the end in the decision of a research strategy. Yin (2003) states that there are two variants of the case study design strategy. There is a single case study and a multiple-case study. The difference between these two variants is that the single case study strategy focuses on a single whereas the multiple-case strategy looks as two or more cases. At this point, Yin focuses on the definition of “case” in order to be able to clearly explain the dichotomy between a single case and multiple-case strategy. Yin provides some examples of what a case may be. He states that it may be an individual, an event, a decision, a program, a process, or an organisation. Yin states that if for example a researcher studies a single individual, for instance a politician, then the study is a single case strategy. However, if a researcher studies several individuals, for instance three musicians from different genres, then the study is a multiple case strategy. This means that each musician is considered a separate “case”. This particular research studies three ICT4D

projects that are situated in two different areas. Therefore this is a multiple-case design strategy.

Yin (2003), states that it is an individual person that a research is studying, then that individual is the primary unit of analysis. He states that the definition of the unit of analysis is dependent upon how the case is defined. The definition of the case, according to Yin, is directly linked to the research question. With regards to this study, the question asked is “How can the design and implementation of developmental ICT interventions be improved in order achieve the desired impact of ICT4D?” The word “how” in the question implies a process. In each project, or case, this researcher is studying the implementation process. The artefact that is produced as an outcome of this study is a framework which can be viewed as a blueprint to provide guidance with regards to the process of implementation of projects. It must be pointed out that the case, or unit of analysis is not just the implementation process of each project, but it is the entire project. This is because Yin (2003) states that when analysing a case, a detailed case description of the case must be provided in for a context to be established. For example, if a researcher studies the effects that being in prison has on a prisoner, then a description of the activities that take place in prison must be described in order to put the effects into context.

This researcher took Yin’s advice when choosing a multiple case study. One aspect that was considered is the quality of the research design. Yin states that there are four conditions that a quality study should fulfil. They are:

1. Internal validity
2. External validity
3. Construct validity
4. Reliability

6.8.1 Construct validity

Construct validity is defined by Saunders, Lewis and Thornhill (2007) as the extent to which measurement questions actually measure the constructs which they intend to measure. Yin (2003) defines construct validity as evidence that the researcher’s paradigm corresponds to the observation being made. In other words, Yin states that construct validity is concerned with whether the application of a given concept is legitimate in the quest to find facts.

Saunders et.al (2007) also explain further, stating that the way to ensure construct validity is by ensuring that the questions being asked, or theories being applied are designed to provide an answer to what is needed to be known. For example, if a researcher wants to find out personality traits that make artists creative, then the questions being asked or theories being applied should be designed to identify personality traits and creativity.

This researcher follow Yin's two step approach to ensure that construct validity is met. The first step is to select specific types of constructs that are to be studied. The second step is to demonstrate that the selected methods of investigating these constructs actually investigate those specific constructs. To satisfy the first step, this researcher articulates that the construct being investigated in the implementation of ICT4D project is rural areas in the Eastern Cape in South Africa. To satisfy the second step, Yin states that it is imperative that the researcher explains why he or she uses the form of evidence that he or she uses in order to justify its relevance and suitability. This study uses first-hand accounts of individuals who have at some stage been involved in the implementation of ICT4D projects in the Eastern Cape. These individuals are interviewed using open ended questions. According to Meyer (2001) the strength of qualitative research lies in the flexible and responsive interaction between interviewer and respondent. She states that this is an advantage for exploring a construct, especially if it is a multiple case approach, which this study is.

6.8.2 Internal validity

Yin (2003) defines internal validity as establishing a causal relationship between two concepts. In this relations, the researcher tries to prove that event x leads to event y, explains Yin. In establishing this relationship, Meyer (2001) states that internal validity is achieved when ambiguity is eliminated, as well as contradictions and rival explanations. Yin explains that internal validity is a concern for some qualitative studies but not for some. For example, Yin points out that internal validity is a concern in explanatory studies but in in descriptive and exploratory studies. In accordance with this information, this researcher would like to point out that the output of this research is a framework. A framework is similar to a blueprint. It is therefore descriptive, as opposed to explanatory.

However, Yin explains that it does not mean that researchers who are not conducting an explanatory study are entirely exempt from internal validity consideration. Yin explains that a case study involved making an inference. Case study researchers make inferences based on

evidence gathered during interviews or from documentation. In other words, this researcher will make inferences, or draw a conclusion based on information collected from interviews. Yin argues that such a conclusion has to be scrutinised as to whether it is correct, if rival explanations have been considered and if it has construct validity. According to Yin, a study that anticipates such questions is effectively dealing with making the correct inferences, which therefore ensures internal validity. In this study, the researcher anticipates questions of correctness of data and rival explanations through the insight gain from a literature review that spans several chapters. This is how this study achieves internal validity.

6.8.3 External validity

According to Yin (2003) and Meyer (2001), external validity refers to the applicability of research findings in other contexts. This seeks to answer if the outcome of a study can be generalized and deemed relevant to other situations similar to the one where the study was conducted. Yin reveals that case studies are often criticised for being not easy to generalise. However, he also points out that this is a false view particularly because most critics erroneously contrast case studies with surveys. Yin explains that the difference between case studies and surveys is that surveys depend on statistical generalization whereas case studies depend on analytical generalisation. Meyer supports this view as she states that the re-applicability of case studies depend on theoretical reasoning as opposed to representativeness. Both Yin and Meyer assert that using multiple cases improves the re-applicability of a case study.

With regards to this study, in accordance with Meyer, this researcher focuses less on the ability to generalise but instead strives for applicability. Meyer explains that applicability, as opposed to generalizability, allows readers to make judgements about the applicability of the research output. Authors such as Ashraf, Hanisch and Swatman (2008), Heeks (2009), Rao (2007) and Melle, Cimellaro and Shulha (2003) argue strongly about the critical importance of understanding and accounting for the context of each area when implementing ICT4D projects. It is not ideal to generalize a framework for implementing ICT4D projects because the context of each location is different. As Meyer points out, focusing on applicability instead of generalizability allows the user to apply their judgement. Therefore, this author argues that it is necessary for readers of the framework produces in this study to have the ability to apply their judgement and make necessary modifications to suit the context of the location in which they are implementing an ICT4D project.

6.8.4 Reliability

Meyer (2001) states that the reliability with the consistency in the research methods being applied as well as whether the findings are replicable if the study is repeated under the same conditions. Yin (2003), states that another researcher should be able to produce the same results if the same procedures that were used by the original researcher are followed. This, according to Yin, calls for the documentation of procedures followed in the study as the first step to achieving reliability. Yin even argues that without such documentation a researcher may not be able to repeat his or her own study. In order to ensure that this study fulfils the reliability criteria, this researcher follows the steps below:

1. **A detailed definition of the cases:**

In chapter 3 of this study, each of the cases that are investigated in this project is described. In chapter 3, the cases were described based on published literature regarding those cases. At this stage of the study, this researcher can reveal that descriptions of those same cases as articulated by interviewees are consistent with those that are found in literature. In accordance with the reliability criteria, it can be stated that any other researcher would acquire the same description of the cases if the research was to be repeated.

2. **A definition of sample of interviewees:**

The sample population chosen for interviews in this study was chosen through a sampling strategy called judgement sampling. According to Marshall (1996) a judgement sample is also known as a purposeful sample, and this is when a researcher choosing the participants according to known characteristics. Each of the projects investigated in this study is implemented by two categories of stakeholders. The first ones are organisations that may be called outsider to the communities in which the project is being implemented. The second ones are the members of this particular communities in which the projects are being implemented. The information need for this study pertains to the implementation process. The sample for this study has been chosen from stakeholders who have been involved in the process both from the community and the outsider organisations. It is their knowledge from their experiences in ICT4D that this researcher seeks. For each case, two subjects are chosen from any outsider organisation and two are chosen from the community. This

amounts to a total of 8 subjects. This is done to get balanced views from both categories of stakeholders. The 8 subjects are interviewed in depth using open ended questions to allow for detailed responses.

3. A description of the research instrument:

The research instrument is a list of open ended interview questions. The questions are designed probe for deeper explanations as opposed to one word responses. The questions that are meant for subjects from outsider organisations are different from those that meant for community members. The questions meant for community members are designed to probe them for their understanding of their needs, their knowledge of ICT and its role, their role in the project, and their views regarding the manner in which the project is introduced in the community and handled as it is being implemented. The questions that are meant for the subjects from outsider organisations are designed to probe them for their understanding of the community needs, their philosophical views about ICT4D implementation approach, their actual experiences during implementation for the project as well as their roles.

4. A description of analysis technique:

According to Yin (2003) there are three major analysis strategies that a case study researcher may use to analyse data. They are theoretical propositions, developing a framework based on rival explanations, and developing case descriptions. This study neither makes any theoretical propositions nor develops a framework on any rival explanations. This study employs the case description strategy. This strategy is coupled with a technique that Yin calls pattern matching. Pattern matching is a suitable approach because the interviewees are chose on the bases that they participated in an ICT4D initiative, which is a key aspect they have in common, and also they answer semi-structured interview questions, an interview style designed to guide responses yet allowing for elaboration. This makes it suitable to analyse the results through the detailed definition of the cases and identification of patterns in the views expressed by interviewees.

6.9 Ethical considerations

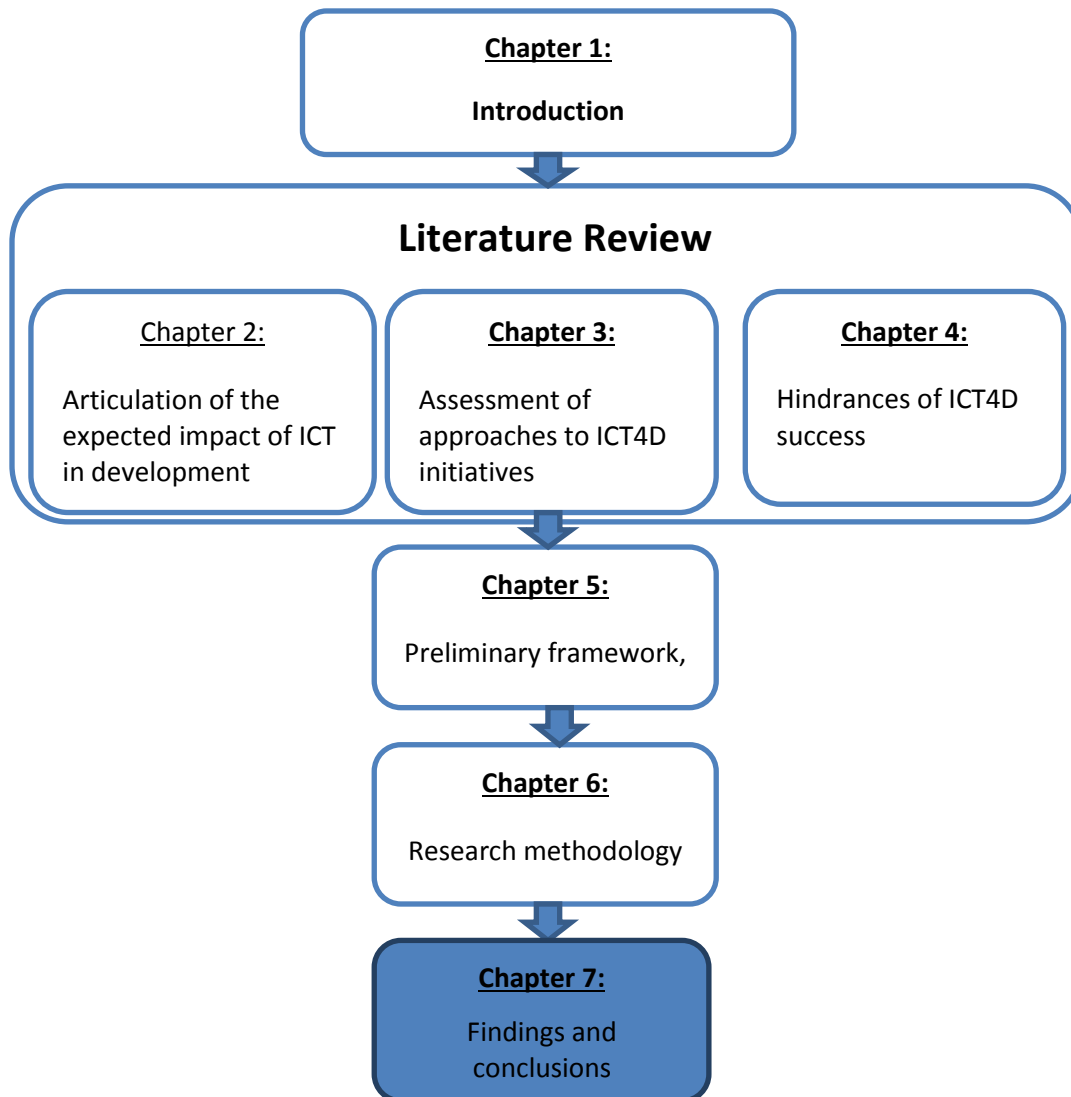
Ethical considerations are articulated in the first chapter of this study. They are stated as follows:

- The study should cause no harm to the participants. The harm to be guarded against in this study will relate to participants' integrity. As this study focuses on initiatives where money has been spent and politics may be a cause for concern, the identity of those that will participate will be kept private.
- The researcher shall ensure that participants grant their consent to participate and that they are well informed as to what it is that they are participating in. It will be explained to all participants what the study is all about and what it aims to achieve, and they shall only participate out of their own will.
- Privacy of participants shall not be invaded. Information that they wish to divulge off the record shall not be used as data in the study.
- The reasons for which participants will be asked to participate as well any clarity that they may seek shall be explained to them truthfully and honestly. Participants shall not be deceived or misled with regards to any aspect of the study.
- An ethical clearance has been obtained according to the University's Ethics Policy,

6.11 Conclusion

The research designed employed in this study is the multi-case strategy. A case study is carried out on the Alice Regeneration project as well as the Siyakhula Living Labs project to find out from stakeholders who were involved in those projects as to how they were handled and implemented. This study is an interpretive qualitative study, and therefore leans towards the phenomenology extreme in Collins and Hussey's (2009) continuum of ontological assumptions. The theoretical background that is used to support this study is the diffusion of innovations theory. This theory is chosen for its relevance in informing of the process that leads to the pervasiveness of idea and innovation in a community over time. In this chapter the validity and reliability of the study are discussed. It is shown that using more than one case study adds to the rigor of the study and helps produce results that are more reliable than had a single case been used.

Chapter 7: Findings and discussion



7.1 Introduction

This chapter presents and analysis and discussion of the empirical data. The researcher begins the chapter by giving an overview of the cases that are being studied. The overview delivers the context of the cases, showing how they are set up, challenges they face and how ICT come into the picture. A table that contain the detailed responses of interviewees is provided for reference and perusal in the appendix section of this document. However, within this chapter, a table that contains summarised responses of the respondents is included to allow for an analysis of their responses. Within this table, views that have been gathered from literature are also included in order to provide and contrast and comparison between the views from literature and those that emerge from the empirical study. As part of the analysis of the data in this table, themes are formed which then subsequently discussed in detail to reveal the outcome of the analysis. These include appropriate technologies, planning for sustainability and project management.

The outcome of the analysis is the framework, which is the artefact of this study. The purpose of developing a framework is to provide a guideline as to how ICT for development projects can be implemented. To ensure the external validity of the study, the researcher explains how the framework relates to the research question and sub-question posed in the beginning of the study. The researcher also argues for the applicability of the framework in different rural areas across South African.

7.2 Case description: Alice Regeneration Project

7.2.1 Alice Profile

Alice is described by Aspire (2010) as a rural university town. It lies between the Tyume Valley and Amathola Moutains, and is surrounded by several rural areas (Aspire, 2010). Alice falls under Nkonkobe Municipality and is home to the historical University of Fort Hare as well as Lovedale College. It has a rich history that, according to Aspire, makes it an attractive tourist destination. The demographics of Alice, as stated by Aspire (2010), entail an estimated population between 8, 947 and 9, 443. These are the figures of Alice residents. The University of Fort Hare has some 6, 500 students Aspire (2010). The youth in Alice makes a large chunk of the population. According to Aspire, 43, 9% of the population is 19 years old or younger. Those that are younger than 15 years old amount to 13, 3%.

Alice challenges

Unemployment is one of the biggest challenges in Alice. Unemployment and poverty is spread across the villages surrounding and according to the Aspire report, a ratio of 10 people depend on 1 person's earnings in this area. The report shows that it particularly the youth that faces unemployment challenges. The reasons are that the biggest employers are the public services sector and the educational institutions. These demand that the 55% of the employed population be highly skilled (Aspire, 2010). This is problematic for the youth considering that many of them come from the impoverished surrounding villages where 13% of the people have never been to school, while 14% of those who went to school never completed matric (Aspire, 2010). According to the Aspire report, some of the problems that Alice faces pertain to ageing infrastructure. The sanitation system is running at full capacity with no upgrade plans, water pipes are old and leaking, and the clustered villages make it challenging to provide infrastructure for all.

Regeneration project

IN its Alice regeneration strategy, Aspire (2011) states that the Alice Regeneration Programme was started as the Alice Rejuvenation Project by the University of Fort Hare alumni and local stakeholders in the early 2000s. Although Alice has an estimated population of more than 9, 443, the feasibility report by Aspire (2010) states that its catchment of consumers number around 100, 000 people because it services population from all the other villages in and around Nkonkobe Municipality. The report states that the main goal of the programme is to make Alice and economically and socially viable university town. The key developmental themes that have been identified to achieve this goal are.

- Provision of accommodation
- CBD upgrade and densification
- Sports and Education
- Heritage Development
- Functional Integration
- Developing Local Agriculture

ICT is identified by the 2011 regeneration strategy as one three interventions that are aimed at directly fulfilling one or more of the development themes. The other two are Heritage

Preservation and Tourism and Promotion and Development of Agriculture Value Chains. Aspire (2010) states “The development of ICT infrastructure and services are seen as critical for the regeneration of Alice as a university town”. It also acknowledges the poor access to ICT outside the university. The report identifies three key opportunities for ICT development in the town. These are:

- Expand the ICT network infrastructure in Alice through institutional partnerships between key local stakeholders and private ICT enterprises.
- Support the establishment of ICT enterprises in Alice to service the ICT needs of local enterprises and residents, such as an Internet cafe, and website development and support to local tourist enterprises.
- Establishment of a Thusong Service Centre to, inter alia, provide ICT training opportunities and facilities in Alice for local residents.

The potential benefits of ICT that the report identifies are stated as follows:

- Broadband will improve the productivity of local enterprises and raise their competitiveness.
- Broadband would attract highly educated individual who require it for work and leisure to live and work in Alice.
- Maintenance and upgrade of ICT infrastructure would be tasked to Fort Hare students. This would reduce costs for the project and provide students with practical work experience.
- An information centre where residents would access information such as employment opportunities, government services etc.

ICT progress status in Alice regeneration project

The Alice Regeneration Project (ARP) is part of the small town revitalization programme (Eastern Cape Department of Roads and Public Works, 2012). Extensive consultations were carried out prior to the launch of the project (Aspire Annual Report, 2010/2011). It must be pointed out that the ARP is not about ICT. The purpose of the programme is to upgrade the whole town of Alice so that it can become an economically and socially viable university town (Alice Small Town Regeneration Strategy, 2011). However, is with the MDGs (UN,

2008), Information and Communication Technology (ICT) is identified as a key enabler that needs to be developed along with the Project (Alice Small Town Regeneration Strategy, 2011). The Alice Small Town Regeneration Strategy (2011), states that there are three interventions that have been identified as having the potential to act as a catalyst for the programme. These interventions are developing middle-income residences for students and upper-middle income earners, upgrading of the Central Business District (CBD), and ICT development. With regards to ICT development, the strategy documents states that there is poor broadband access in Alice therefore the goal is expand the ICT network infrastructure, support the establishment of ICT enterprises and establish a Thusong Service Centre which will provide Internet access to the community.

This study tracks the progress of ICT development in Alice by following up on the Annual Reports that Aspire compiles. The report for the period of the year 2009/2010 states that the purpose during that period was to conduct a feasibility study. The feasibility study yielded a status quo analysis, business case and the regeneration strategy. This researcher has been unable to locate the status quo analysis as well as the business case. The regeneration strategy was, however, located and is examined in this section. With regards to ICT, the Aspire Annual Report for 2010/2011 reported that the University of Fort Hare and the Alice Residents' Association led a consultative process in which a workshop and survey were conducted. The purpose of this exercise was to discover the extent to which Alice residents can benefit from an ICT enabled economic environment, states the Report. The report does not elaborate on the findings of this exercise.

The document that this researcher investigates to track ICT progress in the ARP is the Aspire 2012/2013 Midyear Report which was published on 17 January 2013. With regards to ICT, the report states that task teams have been appointed to follow up on specific issues. One of the issues identified is the need to streamline ICTs in the Alice Regeneration Programme, states the Report. According to the Annual reports examined in this study, there are no practical steps that have been taken to implement ICT in Alice. However the programme may not be regarded as a failure based on this observation, nor can it be concluded that the programme has failed in terms of ICT. What emerges from this report is that there are active aspects of this project. For example, the Aspire 2011/2012 Annual Report reveals that the Alice regeneration business plan was submitted to the National Treasury and funding was granted for public transport hub upgrade (R18.2 million), CBD upgrade (R17.2 million) and residential development (R4.3 million). This information shows that the programme is

active; however, there are other aspects that are given priority over ICT. The reports show that ICT is being given consideration but plans are still at consultation stages.

7.3 Case description: Siyakhula Living Labs

7.3.1 Dwesa profile

Dwesa falls into the Mbashe Municipality (Dugmore, 2012). This municipality has an estimated population of 283, 524 (Mbashe Municipality Draft Development Plan, 2012). According to this Draft Development Plan (DDP), persons under the age of 15 years old make 31, 3% of the population while persons between the ages of 15 and 34 years make 29, 7%. This means the bulk of the population, as it is with Alice, is made of youth. The DDP (2012), states that the areas that fall under Mbashe Municipality which includes Dwesa are “overwhelmingly” rural and poverty stricken. According to Dugmore (2012), the people of Dwesa live in a cluster of villages and in and around Dwesa they number around 20 000.

Dwesa challenges

The DDP (2012), states that unemployment is a prevalent problem across the municipal territory of Mbashe. Across the territory, the DDP states that there is low access to water services, below average access to clinics, limited access to electricity and few tarred roads. Safety concerns are also mentioned due limited police coverage. Dwesa, together with Cwebe are identified by the DDP as two small nature reserves that have the potential to be a tourist hub. The DDP proposes that the Haven Hotel as well as the Dwesa chalets be upgraded in order to boost tourism. The ownership of the Dwesa reserve has since been transferred to the community trust with the condition that nature conservation continues. Poverty persists in Dwesa. Dugmore (2012) writes that the Dwesa community is rural and marginalised, with the nearest town to it being Willowvale some 40 kilometres away. He states that there are few prospects here for the youth. Their likely option is to find work elsewhere.

The Mbashe Municipality, which Dwesa falls under, has identified the following as targeted areas of investment that have major economic potentials (DDP, 2012):

- Agricultural Development
- Fishing

- Mining and quarrying
- Transport facilities
- Bio-fuels
- Mari culture
- Tourism
- Building, construction and roadwork
- Indigenous Medicinal plants
- Manufacturing and SMME
- Forestry

Siyakhula Living Labs project

According to Ranga, Thinyane and Terzoli (2010) the initial goal of the Siyakhula Living Lab (SLL) project when it was started in 2005 was to develop and field-test the prototype of a multi-functional, distributed community communication platform for deployment in marginalized communities in South Africa. Dalvit, Sieborger and Thinyane (2011) explain that prior to the initial deployment of infrastructure there were extensive consultations with the communities and their local power structures. After the consultations schools were chosen as ideal locations to host the infrastructure Dalvit et al. (2011). The first school that was chosen was Mpume School where a Telkom Very Small Aperture Terminal (VSAT) unit was installed and an Access Concentrator was deployed (Dalvit et al., 2011; Dugmore, 2012). Dugmore (2012), states that 5 computer were installed at the staff room. Tanga et al. (2011) state that the project subsequently grew and the ICT platform was deployed in 3 other schools, namely Ngwane Junior Secondary School, Motkwane Junior Secondary School and Nondobo Junior Secondary School. A World Wide Interoperability for Microwave Access (WiMAX) Alvarion Breezemax Micro base station was deployed at Ngwane Junior Secondary School (Ranga et al., 2010). Twele and Thinyane (2011) explain that WiMAX is capable of providing both mobile and fixed internet access, however in the early stages of the Siyakhula Living Labs project it was deployed to provide fixed internet access only. They explain the each node of the WiMAX network has a Wi-Fi hotspot that operates over the VSAT.

The consultations with community members did not end after the inception stage of the project. Gumbo, Thinyane, Thinyane and Terzoli (2011) state that in 2009, this project adopted the Living Lab approach. Gumbo et al. (2011) define a Living Lab as “an approach

that deals with user driven innovation of products and services that are introduced, tested and validated in real life environments”. Ranga et al. (2010) discuss some network challenges that they argue are typical problems and causes of failure for rural ICT initiatives. In this discussion, they point out how the SLL project has managed to overcome these challenges through the Living Lab approach. Two of the network problems identified by Ranga et al. (2011) are difficulty in fault diagnosis and corrupt configurations. With regard to difficulty in fault diagnosis, Ranga et al. (2010) state that the community members, due to lack of knowledge, were prone to misinterpret network faults when they occurred. The unavailability of local technically trained staff made it difficult to monitor the network. They allege that at times users would exacerbate the problem by, for example, trying to fix it by changing local settings whereas the root of the problem originates elsewhere. In accordance with Living Labs approach, the problem was mitigated by training local users on identifying, solving and describing basic network faults. This approach has resulted in skills transfer and reduction in unnecessary travelling for technicians. Ranga et al. (2010) points out that it is expensive for technicians to visit network sites as they are located about 400 km away.

The problem of corrupt configurations identified by Ranga et al. (2010) occurs when configurations on crucial servers and routers get corrupt resulting in the failing of the entire network. They point out that this is problematic because it requires that the equipment be transported to Rhodes or Fort Hare to be reconfigured by a technician. Ranga et al. (2010) state that this problem was overcome by deploying a monitoring system called Nagios. They point out that some default commands of Nagios had to be changed in order to meet the specific needs of the SLL network. Nagios checks network availability and monitors various other services such as the current load, current users, root partition and total processes (Ranga et al. 2010). These two examples provided by Ranga et al. (2010) highlight the collaborative spirit and context oriented solution approach that is articulated by Gumbo et al. (2011) in their definition of a Living Lab. Through the Living Labs approach that is applied in the SLL, Ranga et al. (2010) shows that the problems that arise as the project progresses are solved by improving local capacities through skilling of local users and deploying customized solutions to suit that specific environment. In addition to training local users, a community help-desk has been launched in order to serve as a first “port-of-call” when a technical problem occurs (Gumbo et al. 2011).

Dalvit et al. (2011) and Twele and Thinyane (2011) discuss an expansion of the infrastructure of the SLL. Dalvit et al. (2011) reveals that the plan includes upgrading the existing network

infrastructure from fixed WiMAX to mobile WiMAX, adding five new clients to the new mobile WiMAX base station at Ngwane School. They state that the upgrade from fixed to mobile WiMAX will allow the SLL to experiment with the use of nomadic stations through the use of USB WiMAX dongles with laptop computers or WiMAX enabled mobile handsets. The benefit of this development will be enabling community members to access the internet from their own homes (Dalvit et al. 2011). Twele and Thinyane (2011) state that in order to determine if the mobile WiMAX can be deployed in Dwesa and other areas, feasibility study is to be conducted. Twele and Thinyane (2011) state that the study entails the following:

1. Technical feasibility: this study will help investigate the capabilities of mobile WiMAX through literature review and actual deployment.
2. Physical feasibility: this study will be a pilot to investigate any physical factors that may cause challenges.
3. Socio-technicality: this study will investigate the willingness of the people to adopt this technology as well as their financial ability to use it.
4. Sustainability: this study will determine other services and technologies which may be developed and deployed in the network to sustain full functionality.

Dalvit et al. (2011) reveal that strategy to go about implementing this plan has been laid out in into 3 phases. These are:

- Phase 1: Upgrade existing network and deploy new cell. Ngwane: Install themast and replace the base station with the new mobile WiMAX unit. Mpume, Mthokwane, Nondobo and Nqabara: Replace the CPEs for the new mobile WiMAX units. Badi: Install the old base station; attach a pole to the water tower to house the omni-directional antenna.
- Phase 2: Connect seven new schools. Ntubeni and Ngqeza: Mobile WiMAX CPE. Zwelidumile: Old fixed wireless CPE. Kunene, Nquba, Hlabizulu and Mevana: Old fixed wireless CPE.
- Phase 3: When electricity is available, connect remaining schools.

The SLL has grown from covering 4 schools in 2009 (Gumbo et al. 2011) to servicing 17 schools as of 2012 (Dugmore, 2012). Dalvit et al. (2011) points out that the growth of the SLL has attracted considerable interest. As result, one of its achievements is the decision of

the Department of Education to provide funding for an Advanced Certification in Education (ACE) specialising in ICT (Dalvit et al., 2011).

7.4 Empirical data/findings

The table below show summarised versions of the empirical data collected through open-ended interview questions. This summarised version is the interpretation of the detailed responses from the interviewees. The details responses are provided in this study for the reader's perusal. See Appendix A for these.

Table 6: Responses from participants from organisations outside communities (summarised and interpreted empirical data)						
	Respondent 1	Respondent 2	Respondent 3	Respondent 4	Respondent 5	Themes from Literature
1. With regards to the ICT4D project that you are involved in, what is your understanding of the needs of the community?	Unsure	Unsure	Infrastructure, clean environment, transportation and trading space.	Based on Maslow's hierarchy there is a list of details. Our project focuses in information and communication needs.	Access to computers and computer literacy.	<i>There is no common understanding of what development is. (Thomas, 2004; Gore, 2000; Hickey and Mohan, 2003).</i>
2. How would you describe the approach used in the project that you were involved in?	Mixed approach	Mixed approach	Mixed approach	Mixed approach, co-creation of solutions with community.	Both approaches. Community had a fair say.	<i>Top-down approach (Heeks, 2009; Van Reijswoud; Schupna, 2008).</i>
3. Would you say the approach fostered or hampered the success of the project?	Mixed approach accepted well.	Unsure.	Mixed approach accepted well. Slow progress is due to other priorities.	This approach has been critical for the success achieved.	Fostered success.	<i>ICT4D projects tend to have top-down approaches (Walton and Heeks, 2011; Gilwald, 2010, Schupna 2008)</i>
4. Do you think the 'bottom-approach' should be given priority or the top-down approach?	Bottom-up approach ideal but communities still need to be educated on ICT potential.	Community members are involved. But there is lack of effective way to involve greater numbers.	Analysis involving community was conducted. Responded does not know details of it.	Readiness of community determines how much bottom-up is utilised during project. Before the project bottom-up is mandatory.	Bottom-up ideal but users sometime are not aware of options and opportunities. Education is as important.	<i>Success is likely with both top-down and bottom-up approaches combined (Heeks, 2009; Rao and Mlahan, 2008; Walton and Heeks, 2011).</i>
5. Could you specify the	Computers with	Computer with	Computers. Plans to	Networking	Computers and	<i>ICT4D projects tend to</i>

technologies that were being implemented in the ICT4D project that you were involved in?	Internet connection. Plans to include cell phones.	Internet connection.	include cell phones.	technologies : WiFi, WiMAX, ... - Hardware technologies : server clusters, thin-client computing, ... - Software technologies : Edubuntu, LTSP	Wi-Fi	<i>involve mainly computers (Mtega and Malekani, 2009; Rao, 2008; Njoh, 2011)</i>
6.In your ICT4D project, what do you think the community can do in order to generate enough income to sustain the facilities and equipment once the project is fully implemented?	User fees could be paid but would not be enough. Local government sponsorship ideal.	User fees should be charged. Local government assistance could be sought.	Local municipality should include ICT facilities in their annual budget.	Implement solutions that support daily financial activities of community.	Money spend on unnecessary campaigns and other activities can be channelled here.	<i>Community members usually access facilities for free (Clark and Gomez, 2011).</i>
7.How was your ICT4D project managed in terms of planning, resource allocation, time allocation and coordination of tasks?	Managed enthusiastically considering participation was voluntary.	Project had a steering committee to guide management.	Steering committee leadership lacks capacity. Division of opinions.	There are steering committees.	Driven by reseachers, students and several other people who contributed.	<i>Project management techniques need to be applied (Pade, 2006; Watson and Heeks, 2011).</i>
8.Regarding the collaboration with other stakeholders, are there any problems regarding a common understanding of the role of ICT in the development, the community needs, and the goals?	Common understanding was a problem.	Common understanding was a problem	The only common goal is to bring ICT. Other than that there no agreements on details.	Goals vary according to stakeholders. Success depends on synergy.	Stakeholders displayed various self-interests. However they were aligned to project success.	<i>There is no framework to link development and ICT (Heeks, 2009; Hameed, 2006; Harindranath and Sein, 2007; Thomas, 2004).</i>
9.Do you think it is true that frameworks that have been used in other	Frameworks and models not	Frameworks and models not	Frameworks and models not transferrable.	Frameworks and models not transferrable.	True. Adaptation is needed.	<i>Not transferrable. (Parker, 2000; Schupna., 2008;</i>

successful project can be directly applied in another project without being adapted?	transferrable.	transferrable.		However lessons learnt need to be incorporated.		<i>Mtega and Malekani, 2009; Heeks, 2009)</i>
10. What ICT policies would like to see being implemented soon in order boost ICT4D in South Africa?	Policies are theoretical. There must be practical plans to implement them.	ICT should be made prevalent in education.	Lack of rapport between local government and national government makes policy implementation difficult.	Give ICT4D high priority status and adopt it as one of government's programmes.	Implementation of White paper on e-Education. Put realistic policies and show will and effort.	<i>Poor policies and poor implementation of existing ones. (Gilwald, 2010; Heeks, 2009; Galperin, 2012).</i>
11. It is often stated that one of the problems in ICT4D is that the link between ICT and development is not well understood. Could you please specify the role that ICT plays in the developmental project that you are, or have been involved in?	Difficult to specify role. The goal is to give every access everywhere.	Difficult to specify role.	Difficult to specify role.	Give people access to information and therefore enhance their capability to participate in society.	N/A	<i>It is difficult to identify the role of ICT in development (Heeks, 2009; Hameed, 2006; Harindranath and Sein, 2007).</i>
12. Should unintended positive outcomes in ICT4D be judged as part of the success of a project?	Any success should be recognised.	Any success should be recognised.	Any success should be recognised.	Unintended outcomes have to be acknowledged	Basically, yes unintended outcomes should be acknowledged.	<i>Any success is acceptable.</i>
13. Are there any other views you would like to express?	Alignment to community needs essential. Support by community important. Sustainability must be improved.		The benefits of ICT should be easily apparent. Other technologies besides computers should be considered. People should be educated on ICT4D.			

Table 6: Empirical data outsider stakeholders

Table 7: Responses from community

	Respondent 1	Respondent 2	Respondent 3	Themes from Literature
1.How would you define development?	Access to basic services. Access to computers.	In my point of view it means developing the people in one way or another like skills for example. Also in the sense of developing the area like roads.	I would say it when people have houses, enough food and can afford education.	<i>There is no agreed upon definition of development (Thomas, 2004; Gore, 2000; Hickey and Mohan, 2003)</i>
2. What would you say are the biggest needs or challenges that you community faces?	Employment is the biggest challenge.	No one goes to help in the rural areas. It is expensive for people from rural areas to commute to town for training.	I think the biggest needs for people in my community is a source of income. the unemployment is too much and there are no jobs in the area.	<i>People need basic necessities such as roads, clean water and electricity (Avgerou, 2008; Ngwenyamama, Andoh-Baidoo, Bollou and Morawczynski, 2006).</i>
3. Technology can be used to help with these needs or challenges?	Provide computer skills. Increase employability.	There can be an information centre where people can come and find information. People can also be taught some skills. People can learn about opportunities and government initiatives that can help them.	I think it would give people an opportunity to see other things. Even the things they do every day they can learn to do them better from the internet.	<i>Soriano (2007) provides table to prove that when needs are first specified, ICT to meet them can be determined. Parker, Wills and Wills (2012) makes a similar case.</i>
5. Are you aware of ICT projects in your area and do you feel encourage to participate?	Community members are aware of project.	Yes definitely we are made aware. When there will be a meeting counsellors are informed who then inform their constituents. People are interest but they are always disappointed. They always expect something when a meeting is called but then nothing happens especially with the computers here.	Yes I was very aware. Everyone was talking about the project. It popular in my community and everyone is encouraged especially the youth.	<i>There is general lack of community participation in ICT4D projects (Walton and Heeks, 2011; Thanasankit and Crobitt, 2000; Heeks, 2009)</i>
6. Are there ICT	People are	There is only one internet café in	Yes there are computer labs in	<i>In successful projects, people have been</i>

facilities in your community and how are they beneficial?	able send faxes, type documents and find information.	town and it is publicly owned. There are public places where people can use computers for free.	schools. They are used to provide skills to the learners as well as adult community members. It is good because it is also free	<i>able to receive markets prices of goods, provide education, produce documents, access a helpline (CNN, 2012; Parker, Wills and Wills, 2012)</i>
7. What specific technologies would you say are needed in your community?	More computers.	I would say we need computers. We need the Internet too. All the stuff like printer and scanner would be nice to have people can really use that.	I think my community needed the computers. More computers would be good.	<i>Other technologies often ignored (Osterwalder, 2002). Cellular phones and fibre optic cables are getting more attention (CNN, 2012; Rao and Malhan, 2008).</i>
8. What kind of information do you think people are deprived of in the absence of ICT?	Jobs, sports, business and education.	People need information about everything. For example if you want to sent you child to a university you don't have to call or visit that university to enquire about course, you just visit the website. People need information about job opportunities, training opportunities, everything.	I think people in my community were deprived of all the information that is out there. For example when they have problem they didn't know how to find a solution.	<i>Information related to economic productivity (Wertlen, 2008; Hameed, 2006; Zhao, 2008).</i>
9. In your community, how would suggest income can be generated in order to maintain information technology facilities?	User fees.	I think the municipality should help with funds because people are poor here. The university should also help with skills. Private business can also help fund the project.	The think the involvement of companies like Telkom and the government is good. I think all those things would be too expensive for the community to maintain from their pockets.	<i>Not specified except insistence the financial viability must be planned for (Ashraf, Hanisch and Swatman, 2008; Hickey and Mohan, 2003; Heeks, 2009).</i>
10. Are there any lessons to train people to use ICT in your community?	Yes people do get the opportunity to learn.	At the moment there has not been any technology introduced. We have identified a building where computers can be housed but feedback is needed from government as the building is	Yes including me. Old and young everyone is learning new computer skills. The computers are now available in many schools too.	<i>The level of ICT sophistication determines needed skills (Van Reijswoud, 2009). Most ICT4D project involve teaching computer skills (Sipior et al. 2004).</i>

		owned by the government.		
11. Are there any other views you would like to express?		No I think we have covered nearly everything.	I am hoping that this project can help create jobs and business opportunities in my community because people suffer there because of unemployment.	

Table 7: Empirical data from community members

7.5 Analysis

From the data provided in tables 7 and 8, this researcher identifies four themes that the questions and answers can be grouped into. These themes account for all the questions from both tables as they are interrelated and the analysis below addresses them in a holistic manner. These themes are ‘understand community needs’, ‘appropriate technology and sustainability’ and ‘project management’.

The researcher developed themes from the answers provided by the participants in the empirical study. The researcher used interviewed the participants through the use of semi structured interviews. It worth pointing out once again that all the participants were chosen on the bases that they had participated in an ICT4D initiative in Alice or Mbashe Municipality. As a result of this commonality among them, it was evident from the answers that their responses were not too diverse and therefore could be grouped into themes. In other words, the participants expressed similar views and thus their answers showed a pattern. It is on the bases of this pattern that the researcher was able to group their responses into themes that could be analysed closely. The themes are discussed as follows:

7.5.1 Theme 1- Understanding community needs:

Prevailing response from empirical data: Both outside stakeholders and community members express difficulty in articulating specific ICT needs. However, both the community members as well as the literature in the field are able to identify general needs such as jobs and better living conditions. It emerges from the empirical data that both the bottom-up and top-down approaches are typically used together and that this mixed approach is well accepted and conducive for success.

Prevailing theme from literature: ICT needs are difficult to understand and the relationship between ICT and development is difficult to articulate as well as to substantiate by evidence.

Recommendation: Apply the following three steps that have been applied in Dwesa:

1. Teach the community about ICT.
2. Demonstrate the value of ICT through use.
3. Teach the community about the importance of participation for the survival and growth of the project.

Justification: It has been expressed by some respondents (respondent 1 and 5 from table 7) as well as in literature that due to deprivation in many rural areas, people do not know their needs with regards to ICT because they do not know the solutions and potential that ICT can offer. This means even if the bottom-up approach is used, community needs may not be accurately identifiable. Educating them about ICT first could help them to know and better express their wishes. This assessment is also consistent with the diffusion of innovations theory that is used as the theoretical background of this study. Gouws and van Oudtshoorn (2011) point out that even if a new innovation has obvious benefits, it may not automatically get adopted and diffused into society. However, they state that spreading information about an innovation over time stimulates its adoption from early adopter to laggards. Gouws and van Oudtshoorn explain that diffusion is fundamentally about a communication process. Teaching communities about ICTs and their benefits is a communication process recommended by this study as a first step towards understanding needs of deprived rural communities.

7.5.2 Theme 2- Appropriate technology:

Prevailing response from empirical data: Personal computers (PCs) are found to be the most dominant technology in ICT4D initiatives. The Internet is typically the accompanying technology to the computers. The Internet is made accessible through technologies such as WiMAX and Wi-Fi.

Prevailing theme from literature: Literature also reveals that PCs are the dominant technology accompanied by the Internet (Mtega and Malekani, 2009).

Recommendation: This researcher suggests that technology should not be limited to PCs. The type of technology should be chosen according to the prevalent needs.

Justification: With regards to the choice of technology, this researcher thinks in some instances other technologies may be more suitable than PCs. For example, in chapter 1 of this study Parker, Wills and Wills (2012) examine the RLabs project in the Western Cape. The project is targeted at the youth and aims to provide them with information on their demand with regards to issues they may face such as an HIV/AIDS helpline, drug advice and employment opportunities as they arise. Instant communication is required and easily achievable because of the prevalence of mobile phone ownership by the youth. Therefore choosing a platform that uses mobile phones as opposed to computers is more suited to this

task. On the other hand, in the case of Dwesa and Alice, the empirical data shows that both cases are not just aimed at providing information, but a more holistic use of ICT such as imparting ICT skills, printing, faxing, accessing information and providing education as well job creation. A lab with PC is more suitable for such a goal as all these can be achieved with PCs as opposed to mobile phones.

7.5.2 Theme 3- Sustainability:

Prevailing response from empirical data: It is agreed in the empirical study as well as in literature that these technologies need funds and skills in order to be kept functional. Also, data collected from all the respondents shows that they all suggest that the financial sustainability of such projects depend external sponsors. The respondents argue that other forms of revenue, such as user fees, would not be adequate to maintain all the equipment and sustain the project.

Prevailing theme from literature: Heeks (2009) states that an information society cannot be successful in the absence of technological expertise. Heeks' view reflects a general consensus in literature that skills development is at the centre of technologically enabled societies.

Recommendation: This researcher would suggest that the champions of ICT4D projects form partnerships with community members and other organisations, particularly those that would have an interest in funding them in the long term.

Identify and train local champions. A Reed House System Overview for the Siyakhula Living Labs project released in 2012 states as part of lessons learnt that local champions should be identified and trained to provide the first line of troubleshooting should the need arise. Empirical finding revealed that both the Alice Regeneration Programme and the Siyakhula Living Labs project do have champions within the respective communities. The Alice Regeneration Programme has a champion in the form of a community member who is an entrepreneur and philanthropist. On the other hand, the Siyakhula Living Labs project has champions in the form of teacher at the various schools as well as other community members who have already been trained by the project initiators. Although the Alice Regeneration Programme remains at planning stages in terms of ICT while the Siyakhula Living Labs project has seen grown and several implementations of ICTs, the study shows that in both

cases the presence of local champions has a positive effect in terms of keeping local populations interested in ICT interventions. Therefore, this researcher recommends that finding and training local champions is important not only for introducing a project, but also for sustaining users' interest and development of local skills to solve problems.

This researcher also recommends that ICT projects implementers form partnerships with organizations that have an interest in the success and continuous existence of the infrastructure and equipment that are set up during the project. These would be organizations such as the local Municipality as seen in Alice, or Universities and telecommunications companies as seen in Dwesa (Siyakhula Living Labs project).

Justification: With regards to sustainability, although it may be difficult to measure ICT success, one may argue that the Siyakhula Living Labs project has achieved success between 2006 and 2012 based on its observable growth within the community of Dwesa. According to Dugmore (2012) the project started in one school in 2006 and as of 2012 there are 17 schools that are participating. The empirical data reveals that the project has different stakeholders who have varying interests in seeing the project continue in the long run. The education institutions are involved for both humanitarian and research and development purposes, industry is interested in product development and market exploration while government is interested in service delivery, says one respondent. Dugmore states that partnerships with long term commitment are needed for ICT4D success. It is recommended to form such partnerships as they are important for both continuous evolution of the project and financial sustenance. Several respondents from both table 7 and 8 argue that charging user fees is not the best approach because those funds would not be adequate. Therefore aligning a project with partners that would share the burden of financial support and technical approach is a plausible way of ensuring sustenance

7.5.4 Theme 4- Project implementation:

Prevailing response from empirical data: The respondents from both table 7 and 8 point out that the projects have steering committees that represent all stakeholders including the community. With regards to common understanding of issues between all the stakeholders and among the steering committees, most of the respondents reveal that this area is problematic.

Prevailing theme from literature: In literature not much has been found regarding how steering committees should be managed to order to able to reach consensus on issues. However, literature explains the reason why it is difficult to find an agreement on issues regarding ICT4D. According to Heeks(2009), Hameed (2006), Harindranath and Sein (2007), and Thomas (2004), the problem is the lack of a framework to link ICT with development.

Recommendation: This researcher would suggest that project management practices be applied in running steering committees as well as identifying common goals and milestones.

Justification: In her dissertation investigating project management techniques for sustainable ICT projects in rural areas, Pade (2006) states that project management “provides a single point of integrative responsibility” towards achieving project goals. Applying project management practices calls for the appointment of manager or champion who will be responsible for the project and foster that single point of integrative responsibility. According to Prescott (1995) for an innovation to improve the chances of successful implementation an active champion is needed. This point is particularly because as gathered from one respondent, although projects are managed enthusiastically, participation remains voluntary. This research would argue that to appoint someone or a committee that can give the project a higher level of priority is particularly important when participation is voluntary. Pade (2006) argues that a project manager would be the one to facilitate the whole process to meet the goals. Pade shows that project management practices allow for the identification of targets and formulations to meet them. She states that project scope management helps in defining and managing work that needs to be accomplished. Dugmore (2012) shows that the Siyakhula Living Labs project has a short-term goal (build direct benefits in 1 to 2 years), medium-term goal (network the community and build a bridge to the knowledge society in 3 to 5 years) and a long-term goal (activate full participation in the knowledge society in 6 to 9 years). Project management practices if applied would provide the 4 key knowledge areas needed for success which according to Pade present a “quadruple constraint”.

The three themes discussed above are derived from the interpretation of all the data presented in table 7 and 8. It an analysis of the respondent’s views which captures their collective thoughts on the questions asked in the interviews. This analysis directly informs the refinement of the framework that that was proposed in the previous chapter. The framework proposed in this chapter is therefore directly informed by empirical evidence collected

through open-ended question interviews as well as takes into account views from literature provided by other authors. Figure 6 is the framework that answers the main question that this study sought to investigate.

7.6 Discussion

7.6.1 Community needs and perspectives

The responses to this question reveal that community needs are difficult to understand. This corroborates the views expressed in literature and reveals a problem that needs to be addressed early in the project because an intervention is supposed to speak to the needs of the community. Understanding the needs of communities is therefore an important factor that the refined framework needs to raise. It must be pointed out that the respondents admit to not understanding community needs even though there is also a consensus that the approach used is not top-down but a combination of top-down and bottom-up approaches. A combination of these approaches means that the community is consulted. Indeed the respondents also produce similar answers when asked if the community is consulted for their views. From the community members table, it can be noted that community members attest to being consulted. Taking into consideration that the information reveals that indeed community members are consulted and involved, yet their needs remain ambiguous, this researcher therefore concludes that the methods used to elicit the needs of the communities need to be designed so that they are suitable to collect specific and accurate information about that particular community. This researcher cannot recommend a specific method to elicit community needs because each project is carried out in a different context that presents different challenges. However the framework will indicate information to the effect that a needs analysis must be designed to produce accurate information. Table 2 in chapter 2 provides a list of the strategic priorities provided by the government as part of the national development strategy (MDG South African Report, 2012). These are strategic priorities that have been identified by the government and can be used by ICT4D implementers as a starting point to understanding the needs of South African communities. It must also be pointed out that leaving the framework open for implementers to design some of their methods allows the framework to be applicable in different contexts.

7.6.2 Appropriate technology

The question about technology reveals that computers together with the Internet are central to ICT4D projects. Both outsider implementers and community members agree on this answer. This finding is consistent with the information provided by Mtega and Malekani (2009) in the literature. There suggestions from some of the respondents that some other technologies should be given some consideration. However, when the community members are probed about desirable technologies they point to the computer. The reasons that are uncovered from the respondents is that computer provide the ability to acquire some IT skills which are desirable for employability. It must also be noted that in all the cases, unemployment is mentioned community members as one of their communities' biggest problems. Parker, Wills and Wills (2012) states that by 2008 there were 45 million mobile phone subscribers in South Africa. This shows that prevalence of mobile phones as an information technology. It can be argued that the prevalence of mobile phones is a characteristic of development, however, the call for computers by community respondents to this study shows that mobile phones are viewed by community members in the light of ICT4D. As a reason for this, we may refer to the skills development and employment problems faced by rural communities. To their support, it can be argued that one cannot learn marketable skills such as typing and graphics design from a mobile phone. One cannot produce a brochure, curriculum vitae or send a fax from a mobile phone. These are some of the things that the respondents in the study revealed that community members would like to do. This is not to say that mobile phones make no contribution. When asked a question about information that community members typically search from the Internet, one community responded mentioned that people typically search for information related to economic activities such as jobs, business related information and funding. When researcher asked the respondent about information regarding health, the respondent stated most people typically seek health information when they have a problem and they would rather go to the clinic for it. This information reveals both a specific community need and a specific technology to meet that need.

7.6.3 Planning for Sustainability

It emerged from the empirical study that two of the major reasons for which ICT facilities fail to remain functional after the project has been implemented are loss interest in the technology by community members and loss of financial support when implementers from outside the communities leave taking with them their financial resources. Respondents in the study were

consistent that if the community members are interested in keep the ICT equipment functional once donors leave they could pay user fees to mitigate the problem of loss of funding. However it also emerged from the study that relying on user fees would not produce adequate funds to cater for the costs that pertain to running an entire telecentre or computer lab. Some of the respondents pointed out that the problem of funding could be mitigated by convincing local municipalities to include the costs of running such community ICT facilities in their list of requested funding when they send a budget proposal to the government. One respondent explained to this researcher that local municipalities act as an extended arm of the national government and therefore they have a duty to implement government policies. The South African MDG Report (2010) provides a list of the governments development strategies as well as how they link up with the United Nations' Millennium Development Goals. In this report, Both the South African government and United Nations identify ICT as an important delivery mechanism for some of the development strategies. It is therefore plausible that ICT projects in rural areas in South Africa could be financed by the government through local municipalities for sustainability.

7.6.4 Maintaining community interest in the ICT infrastructure

Maintaining continuous community interest in the ICT facilities after the project has been fully implemented is important from its long term sustainability. A respondent interviewed about the Siyakhula Living Labs project narrated how community members made contributions to buy a second printer. This is an indication of continuous interest of the community in the facilities, and it can be pointed out that indeed the project has grown from offering ICT services from the premises of one school to offering ICT services from premises of eleven schools in the area. This speaks to the continuous demand and support of the project by the community. On this note, this researcher would advise that the interest of the community is by good marketing or grand ideas, but it is a result of the alignment of the technology to the needs of the community. This point can be substantiated by applying the Technology Acceptance Model. This model shows that perceived usefulness does have a bearing on the behavioural intention to and ultimately actual use of technology (Davies, 1989).

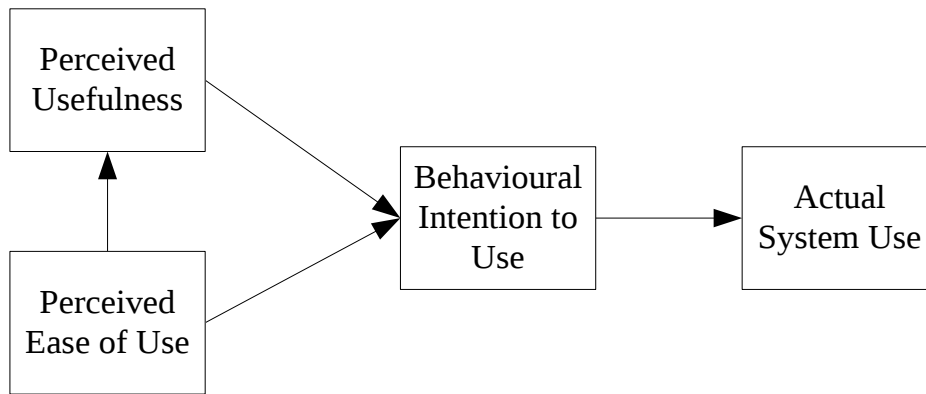


Figure 5: Technology Acceptance Model (Davies, 1989)

7.6.5 Project management

An analysis of the empirical data shows that ICT4D project are managed by steering committees. Some respondents indicated that sometimes there are several steering committees that are responsible for different aspects of a project. Shelford and Remillard (2003) state that some of the core activities involved in project management include writing documentation, creating timelines, managing deliverables and milestones, facilitating meetings and providing a single point of contact for all stakeholders. The management of a project cannot be overlooked. The reasons lie in some of the responses that some respondents gave. One respondent pointed out that in the project he has been involved in the understood general goal of the project was to implement ICT as part of the drive towards a knowledge economy. However, the respondent admitted that further details regarding goals and targets were sketchy. In other words, the steering committee did have timelines, milestones and targeted deliverables. Based on this information, this researcher believes that project management practices are to setting and meeting targets. Project management in ICT4D implementation is therefore an aspect that the framework draws attention to.

Figure 5: Refined framework

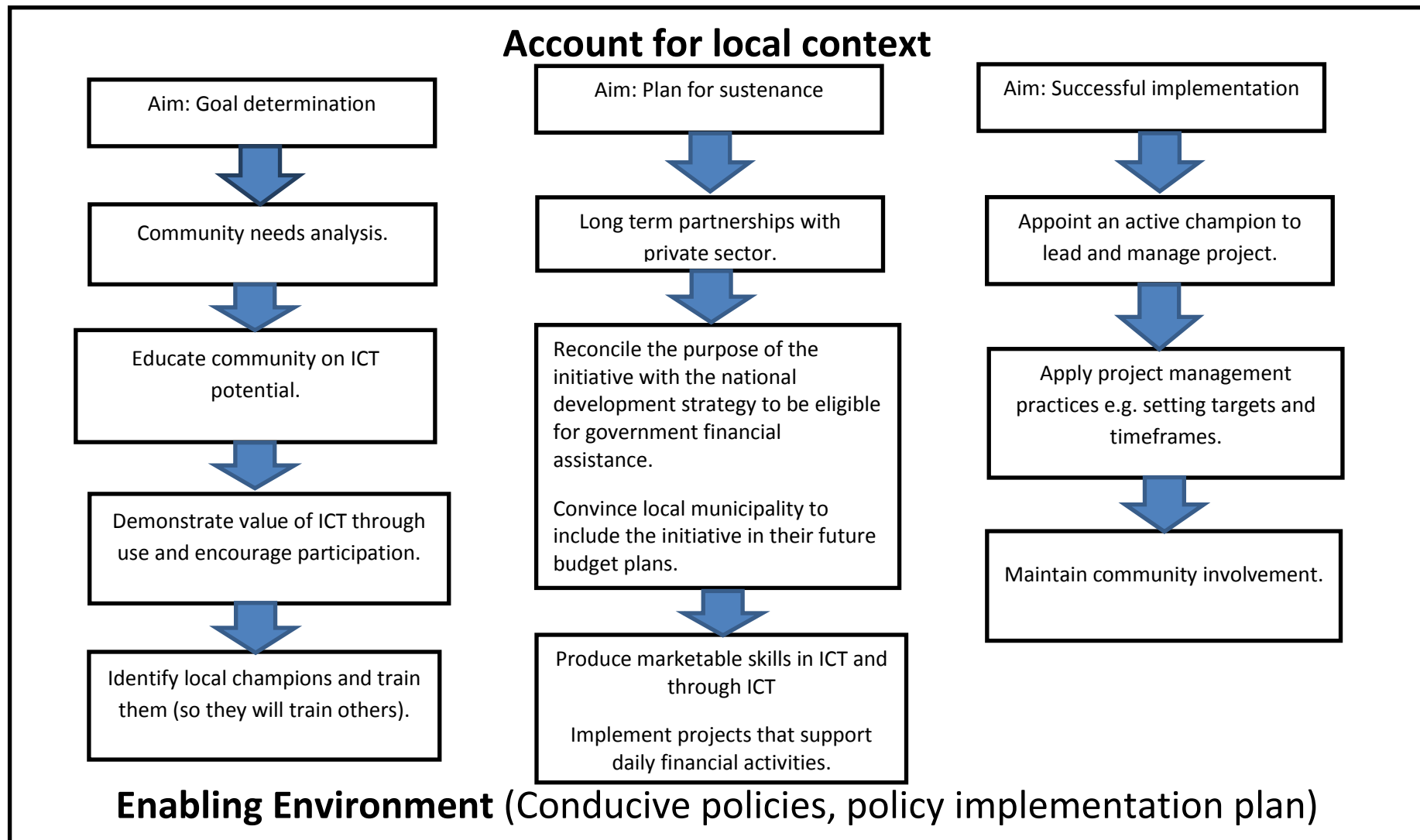


Figure 6: Refined framework

7.6.6 Linking framework to development

An important outcome of this study is a framework that can guide development through ICT. The framework proposed above highlights how ICT can be successfully implemented in rural development in South Africa. However, this framework has to be appropriately linked to development so that indeed it serves its intended purpose. It is shown in chapter 1 that development is broad field and defining it is difficult. However, Hickey and Mohan (2003) provides three different definitions of development. This study, as declared in chapter 1, views development according to Hickey and Mohan's second definition which states that "development is planned changes that are beneficial to society or that are intended to advance society" Hickey and Mohan (2003).

This framework provides a blueprint of how ICT can be successfully implemented in rural areas in South African in a manner that it will be beneficial to the rural communities. When interviewees were asked as to how ICT can benefit their communities, they counted benefits such as information about jobs and schools. The study found that prior to the Siyakhula Living Labs project, the community of Dwesa had to travel 40 km to the town of Williwvale if they wanted to send a fax or to photocopy documents. The Dwesa community members who participated in this study pointed out that due to the successful implementation of ICT facilities in their community; there is no longer a need for community members to travel to town to perform such tasks. This is an example of a planned change that is beneficial to society and the role that this framework plays is to ensure that such planned changes are implemented successfully.

8. Conclusion

This chapter presents an ICT4D project implementation framework for rural areas in South Africa. This framework is produced as an answer to the main research questions posed in the beginning of this study. The main question, as well as sub-questions, has therefore been answered during the process of the formulation of this framework. The framework had been formulated and is supported by views from both literature as well as empirical study. Open-ended question interviews with individual who have been involved with ICT project in the two cases that this study focuses on were carried out to tap into their knowledge and practical experiences in an ICT project. The researcher ensures that the study is valid and reliable by

discussing validity and reliability in chapter 6. This study concludes by highlighting how the study has addressed all the questions posed in the beginning.

8.1 How framework links with sub-questions

In accordance with the external validity that this study needs to fulfil, this researcher shall at this point show how the empirical study leading to the framework proposed as the artefact of this study relates to the research sub-questions articulated in the first chapter. This study has four sub-questions. They are:

1. How can ICT interventions advance development?
2. How are ICT interventions currently undertaken?
3. What is hindering ICT4D from having the expected impact?
4. What needs to be done in terms of design and implementation of ICT4D initiatives in order to achieve the desired impact?

8.2 How can ICT interventions advance development?

In order to address this question, participants in the study were asked to explain the needs of communities as well as the role that they think technology can play. These questions revealed that communities need basic services such as clean water, housing, roads, and electricity. One respondent explained that the implementation of ICT is slow in one area because services such as clean water are given higher priority and attention. This question helped the researcher understand that ICT can advance development by being closely aligned to community's informational need as opposed to being accessible in general. For example, one respondent revealed that when people need help information they prefer to just go to the clinic. This means that from the community's point of view, providing a computer application that provides health information would be a less important developmental step than providing a clinic that operates efficiently. This question is therefore addressed by pointing out that despite all the information that can be accessed through ICT, ICT will contribute to development when it delivers the kind of information and skills that communities want and can rely on it to provide, such as information about jobs and business related information as pointed out by one community member who participated in the study. This information then reflects on the framework to give a guideline as to the importance understanding the gaps ICT can close and thus identifying the correct technology for the task.

8.3 How are ICT interventions currently undertaken?

This question is addressed throughout the interview questionnaire as the purpose of the purpose of the interviews was to learn from the experiences of the respondents about the implementation of ICT4D projects. Information from the empirical study regarding this topic corroborated information found in literature that indeed ICT4D projects are typically initiated or driven by more than one organisation. The empirical study revealed that projects are managed by steering committees. It is desirable for a project to have some leadership. However, the empirical study also revealed that there are loopholes in the management of projects. These loopholes exist in the form lack of project management practices such as defining of goals and setting of targets and milestones. The study revealed that ambiguity with respect to goals, targets, the role of technology and implementation procedure are prevalent. The framework recommends that attention be paid to project management practices as they address such problems.

8.4 What is hindering ICT4D from having the expected impact?

This question is addressed by the same factors as the ones mentioned in the previous one above. Furthermore, the study revealed that failure to plan for the sustainability of a project once it is complemented, particularly with respect to financial support, is a point of weakness in making an impact. This researcher learnt from the respondents in the interviews that it is viable to have the local municipalities support such initiatives financially especially if they are in line with government's development strategies. This is also reflected in the framework.

8.5 What needs to be done in terms of design and implementation of ICT4D initiatives in order to achieve the desired impact?

The answer to this question is in the form of a framework that is illustrated in the form of a diagram. The framework incorporates all the information gained from addressing all the other sub-questions. It must also be pointed out that once all the other sub-questions have been addressed, which includes this one, the question posed as the main question of this research is inherently addressed.

8.6 Why this framework is plausible as a blueprint

This framework is plausible as a blueprint for implementing ICT4D in rural areas in South Africa because it draws wisdom from both literature and empirical evidence. The study uses literature to acquire views from other authors and researchers. In addition to this, this study conducts a multiple case study, covering three cases in order to produce a strong set of data. Yin (2009) and Meyer (2001) assert that multiple cases studies have the potential to produce strong evidence. This study examines each in the context of its unique environment through the views of participants who have involved in ICT4D initiative in those environments, and also take into account the generic factors imposed on all rural areas in South African through, for example, government policies. The study framework addresses some factors that are considered fundamental in Information Systems such as technology alignment to goals, user participation as well as project management.

8.7 Why framework is applicable in different rural areas

As mentioned in the research design chapter of this study, according to Meyer (2001) a case study solution can either be generalizable or applicable in another context. This researcher declared that applicability of the framework produced in this study is more desirable than generalizability. The justification for this can be found in both the literature and the empirical evidence presented in this study. Rao (2009) argues that literature pertaining to the success of ICT4D is mostly based on developed countries. He point out that the frameworks and models applied in developed countries to achieve that success cannot be used in developing countries because the context is completely different. In the empirical study, there was a consensus among the respondents in this regard as well. This therefore substantiates the assertion that a framework for implementing ICT4D initiative may not be generalizable.

This researcher argues that a framework to implement ICT4D projects in rural areas in South African may be applicable from one rural area to the next provided the framework allows for the review of the context of each area. There are some basic similarities that have been uncovered from the empirical study that makes rural areas in South Africa similar to a certain level. These are:

They fall under the same national government. This means they governed by the same policies, requirements and research strategies. In this regard, it makes them fall under an identical environment.

They have similar problems with regards to lack of basic services such as clean water, good roads, resources and job opportunities. In this regard, adapting the framework from one rural area to another would not require massive changes.

9. References

- Acker, J. C., & Mbiti, I. M. (2010). Mobile Phones and Economic Development in Africa. 1-38.
- Akpan-Obong, P. (2007). Information and Communication Technologies in Development:. *International Conference on Social Implications of Computers in Developing Countries*. Sao Paulo.
- Ashraf, M., Hanisch, J., & Swatman, P. (2008). Towards a conceptual framework for understanding ICT for development (ICT4D) projects in developing countries. *IADIS International Conference, Society and Human Beings* , 139-144.
- ASPIRE. (2011). *Alice Regeneration Strategy*. East London: ASPIRE and Department of National Treasury.
- ASPIRE. (2009/2010). *Annual Report*. East London: Aspire.
- ASPIRE. (2010/2011). *Annual Report*. East London: Aspire.
- ASPIRE. (2011/2012). *Annual Report*. East London: Aspire.
- ASPIRE. (2013). *Aspire Performance Reporting: July 2012-December 2012*. East London: Aspire.
- Avgerou, C. (2008). Information systems in developing countries: a critical research review. *Journal of Information Technology* , 133–146.
- Bailur, S. (2007). THE COMPLEXITIES OF COMMUNITY PARTICIPATION IN ICT FOR. *International Conference on Social Implications of Computers in Developing Countries* (pp. 1-17). Sao Paulo: London School of Economics.
- BAZOVKINA, N. (2011, January 14). *Mirage*. Retrieved October 18, 2012, from Mirage Website: <http://repository.enu.kz/handle/123456789/859>
- Bryman, A. (2004). Qualitative research on leadership: A critical but appreciative review. *The Leadership Quarterly* , 729-769.
- Cadenasso, M., Pickett, S., & Grove, J. (2006). *Dimensions of ecosystem complexity: Heterogeneity, connectivity, and history*. Ecological complexity.
- Cambridge University Press. (2003). ICT and Rural Societies: Opportunities for Growth. *The International Information and Library Review* , 345-351.
- Chambers, R. (2004). *Ideas for development: Reflecting forwards*. Sussex: Institute of Development Studies.
- Chaudhuri, A. (2012). *ICT4D: Solutions seeking problems*. New Delhi: National Institute of Science.
- City Press. (2012, November 4). Plugged in on the wild coast. p. 13.
- Clark, M., & Gomez, R. (2011). The negligible role of fees as a barrier to public access computing in developing countries. *Electronic Journal on Information Systems in Developing COuntries* , 1-14.

Collins, J., & Hussey, R. (2003). *Business research: A practical guide for undergraduate students*. New York: McGraw-Hill.

Creswell, J. W. (2007). *Qualitative Inquiry and Research Design 2nd Ed.* . London: Sage Publications, Inc.

Crocker, S. (2009, April 6). *New York Times*. Retrieved 8 2, 2012, from New York Times Website: http://www.nytimes.com/2009/04/07/opinion/07crocker.html?_r=0

Dalvit, L., Sieborger, I., & Thinyane, H. (2011). *The expansion of the Siyakhula Living Lab: a holistic perspective*. Zanzibar Islands, Tanzania: In Africomm 2011.

Davies, F. (1989). *Perceived usefulness, perceived ease of use, and user acceptance of information technology*. MIS Quart.

Dugmore, H. (2012). *Siyakhula Living Lab: An important step forward for South Africa and Africa*. Grahamstown: Rhodes University.

Engelbrecht, H.-J., & Xayavong, V. (2006). ICT intensity and New Zealand's productivity malaise: Is the glass half empty or half full. *Information Economics and Policy* , 24-42.

Flor, A. G. (2001). *ICT and poverty: The indisputable link*. Bangkok: Asia Development Forum.

Galperin, H. (2001). *Goodbye digital divide, hello digital confusion? A critical embrace of the emerging ICT4D consensus*. Cape Town: Creative Commons.

Gichoya, D. (2006). *Factors affecting the successful implementation of ICT projects in government*. Leicestershire: Research School of Informatics, Loughborough University.

Gillwald, A. (2010). *The poverty of ICT policy, research, and practice in Africa*. Cape Town: Creative Commons.

Gore, C. (2000). The rise and fall of the Washington Consensus as a paradigm for developing countries. *World Development* , 789-804.

Gouws, T., & van Oudtshoorn, G. P. (2011). Correlation between brand longevity and the diffusion of innovations theory. *Journal of Public Affairs* , 236-242.

Gumbo, S., Thinyane, H., Thinyane, M., Terzoli, A., & Hansen, S. (2012). Living Lab Methodology as an Approach to Innovation in ICT4D: The Siyakhula Living Lab Experience. *IST Africa* (pp. 1-9). South Africa: International Information Management Corporation.

Hameed, T. (2007). *ICT as an enabler of socio-economic development*.

Harindranath, G., & Sein, M. K. (2007). Revisiting the role of ICT in development. *International Conference on Social Implications of Computers in Developing Countries* (pp. 1-12). Sao Paulo: School of Management Royal Holloway.

Harris, A., & Spillane, J. (2008). Distributed leadership through the looking glass. *Management in Education Vol. 22* , 31-34.

Harris, R., & Rajora, R. (2006). *Empowering the Poor: Information and Communications Technology for Governance and Poverty Reduction: A Study of Rural Development Projects in India*. UNDP-APDIP.

Heeks, R. (2008). ICT4D 2.0: The next phase of applying ICT for international development. *IEEE Computer Society* , 26-33.

Heeks, R. (2009). *The ICT4D 2.0 Manifesto: Where next for ICTs and international development?* Manchester: Development Informatics Group.

Hickey, S., & Mohan, G. (2003). *Relocating Participation within a Radical Politics of Development*:. Manchester: University of Manchester.

Hornor, M. S. (2007, May 26). *Disciplewalk*. Retrieved September 18, 2011, from Disciplewalk Web site: http://www.disciplewalk.com/files/Marianne_S_Hornor.pdf

Hutter, M. (1999). *The commercialization of the Internet: A progress report*. London: The active consumer.

Kamel, S., Rateb, D., & El-Tawil, M. (2009). THE IMPACT OF ICT INVESTMENTS ON ECONOMIC DEVELOPMENT IN EGYPT. *The Electronic Journal on Information Systems in Developing Countries* , 1-21.

Leonard-Barton, D. (1992). Core Capabilities and Core Rigidities: A Paradox in Managing New Product Development. *Strategic Management Journal Vol. 13* , 111-125.

Marais, M. (2011). An analysis of the factors affecting the sustainability of the ICT4D initiatives. *ICT for development: people, policy and practice* (pp. 100-120). Pretoria: Meraka Institute.

Marshall, M. N. (1996). Sampling for qualitative research. *Family Practice* , 522-525.

Mbashe Municipality. (2011/2012). *Draft Integrated Development Plan*. East London: Mbashe Municipality.

Mbhashe Municipality. (2011/2012). *Draft Integrated Development Plan*. East London: Mbhashe Municipality.

Meyer, C. B. (2001). A Case in Case Study Methodology. *Field Methods* , 329-352.

Mtega, W. P., & Malekani, A. W. (2009). Analyzing the usage patterns and challenges of telecenters among rural communities: Experience from four selected telecenters in Tanzania. *International Journal of Education and Development using Information and Communication Technology* , 68-87.

News24. (2012, August 2). Retrieved August 2, 2012, from News24 Website: <http://www.news24.com/SouthAfrica/News/Army-to-be-deployed-to-gang-hit-areas-20120802>, 2012

Ngwenyama, O., Andoh-Baidoo, F. K., Bollou, F., & Morawczynski, O. (2006). Is there a real relationship between ICT, health, education and development? An empirical analysis of five West African Countries. *The Electronic Journal of Information Systems in Developing Countries* , 1-11.

- Njoh, A. J. (2012). Implications of spatial and physical structures for ICT as a tool of urban management and development in Cameroon. *Habitat International* , 343-351.
- O'Connor, G. C., & Nayaranan, V. K. (2010). *Encyclopedia of technology and innovation management*. Wiltshire: John Wiley and Sons.
- Osterwalder, A. (2002). *ICT in developing countries*. Geneva: University of Lausanne.
- Pade, C. I. (2006). An investigation of ICT Project Management Techniques for Sustainable ICT projects in rural development. *Masters Dissertation* .
- Pade-Khene, C., Palmer, R., & Kavhai, M. (2012). A baseline study of a Dwesa rural community for the Siyakhula Information and Communication Technology for Development project. *Information Development* , 265-288.
- Parker, E. B. (2000). Closing the digital divide in America. *Telecommunications Policy* 4 , 281-290.
- Parker, M., Wills, J., & Wills, G. (2012). *RLabs: A South African perspective on a community driven approach to community informatics*. UK: University of Southampton.
- Prensky, M. (2004). What can you learn from a Cell Phone? Almost Anything! *\$th Conference on Mobile Learning*, (pp. 1=-9). Cape Town.
- Prescott, M. B. (1995). *Diffusion of Innovations Theory: Borrowings, Extensions, and Modifications from IT researchers*. Tampa, Florida: University of South Florida.
- Quest, R. (Director). (2012). *CNN News: Rwanda ICT* [Motion Picture].
- Ranga, M. M., Thinyane, M., & Terzoli, A. (2010). *Exploring cost-effective reinforcements for rural telecommunication networks: Dwesa case study*. South Africa: The Spier Estate.
- Rao, N. H. (2007). A framework for implementing information and communication technologies in agricultural development in India. *Technological Forecasting and Social Change* , 491-518.
- Rao, S. S. (2005). Bridging the digital divide: Efforts in India. *Telematics and Informatics* , 361-375.
- Rao, S. S. (2008). Social development in Indian rural communities: Adoption of telecentres. *International Journal of Information Management* , 474-482.
- Rao, S., & Malhan, I. V. (2008). Transforming Indian farmers to reach the next level of the green revolution through communication of strategic knowledge and increased use of ICTs. *The Interview Information and Library Review* , 171-178.
- Rashid, A. T., & Elder, L. (2009). Mobile Phones and Development: An analysis of IDRC-Supported Projects. *The Electronic Journal on Information Systems in Developing Countries Vol. 36* , 1-16.
- Rogers, E. (1995). *Diffusion of Innovation 4th Ed.* . New York: The Free Press.
- Roman, R. (2004). *Diffusion of Innovations as a theoretical framework for telecenters*. San Francisco: The Massachusetts Institute of Technology.

- Rose, J., & Scheepers, R. (2001). Structuration theory and information development-Frameworks for practice. *The 9th European Conference on Information Systems* (pp. 217-231). Bled: Global Co-Operation in the new Millenium.
- Rossouw, N., Botha, D., & Dlamini, E. (2005). A review of a water quality information management system for a water management authority in South Africa and Swaziland. *The Electronic Journal on Information Systems in Developing Countries* , 1-11.
- Saunders, M., Lewis, P., & Thornhill, A. (2007). *Research Methods for Business Students 4th ed.* London: Pearson Education Limited.
- Schuppan, T. (2009). E-Government in developing countries: Experiences from sub-Saharan Africa. *Government Information Quartely* , 118-127.
- Shelford, T. J., & Remillard, G. A. (2003). *Real Web Project Management*. Boston: Pearson Edication.
- Sipior, J. C., Volonino, L., & Marzec, J. Z. (2004). *A community initiative that diminished the digital divide*. Vienna: Communications of the Association for Information Systems.
- Soriano, C. R. (2007). Exploring the ICT and rural poverty reduction link: Community telecenters and rural livelihoods in Wu'an, China. *The Electronic Journal on Information Systems in Developing Countries* , 1-15.
- Stake, R. E. (1995). The art of case study research. *Educational Researcher* , 49-68.
- Szirmai, A. (2005). *Dynamics of Socio-Economic Development: An Introduction*. Cambridge: Cambridge University Press.
- Thanasankit, T., & Corbitt, B. (2000). Cultural context and its impact on requirements elicitation in Thailand. *The Electronic Journal for Information Systems in Developing Countries* , 1-19.
- Thinyane, M., & Twele, N. (2012). An Investigation of Mobile WiMAX Feasibility for Service Provisioning in MRA/ICT4D Contexts. *South African Telecommunications Network Applications*.
- Thomas, A. (2004, February Tuesday). *Sage Publications*. Retrieved January Thursday, 2013, from Sage Publications Website: http://www.sagepub.com/upm-data/18296_5070_Sumner_Ch01.pdf
- Thompson, S. (Director). (1997). *BBC Hard drive haven: History of the personal computer* [Motion Picture].
- Tongia, R., & Subrahmanian, E. (2006). *Information and Communication Technology for Development (ICT4D): A design challenge*. Carnegie Institute of Technology.
- Torjman, S. (2005). *What is a policy*. Ottawa, Ontario: The Calendron Institute of Social Policy.
- Torres, L., Pina, V., & Acerete, B. (2005). E-Government on delivering public services among EU cities. *Government Information Quartely* , 217-238.
- Tullett, J. (2012, April 17). *IT Web*. Retrieved 8 2, 2012, from IT Web We Site: http://www.itweb.co.za/index.php?option=com_content&view=article&id=53579

Twele, N., & Thinyane, M. (2011). *An investigation of Mobile WiMAX feasibility for service provision in MRA/ICT4D contexts*. South Africa: University of Fort Hare.

Usman, N., & Said, I. (2012). Cursary ICT policy as impediment site management (A case study of Nigeria). *Canadian Journal of Environment, Construction and Civil Engineering* , 58-61.

Van Melle, E., Cimellaro, L., & Shulha, L. (2003). A Dynamic Framework to Guide the Implementation and Evaluation of Educational Technologies. *Education and Information Technologies* , 267-285.

van Reijswoud, V. (2009). Appropriate ICT as a tool to increase effectiveness in ICT4D: Theoretical considerations and illustrating cases. *Electronic Journal on Information Systems in Developing Countries* , 1-18.

Walton, M., & Heeks, R. (2011). *Can a process approach improve ICT4D project succss?* Manchester: Development Informatics Group.

Weber, J. s., & Toyama, K. (2010). *Remebering the past for meaningful AI-D*. University of Michigan.

Wertlen, R. R. (2008). An overview of ICT Innovation for Developmental Projects in Marginalised Rural Areas. *Prato CIRN 2008 Community Informatics Conference* (pp. 1-13). Grahamstown: Rhodes University.

Yin, R. K. (2003). *Case Study Research: Design and Methods*. California: Sage Publications, Inc.

Zhao, J. (2008). ICT4D: Internet adoption and usage among rural users in China. *Springer Science and Business Media* , 9-18.

(Leonard-Barton, 1992) (Rashid & Elder, 2009) (Prensky, 2004) (Acker & Mbiti, 2010)
(Harris & Spillane, 2008) (Rose & Scheepers, 2001)

10. Appendix A: Empirical data

Table 9: Raw empirical data (from stakeholders outside of communities)

Question	Respondent 1	Respondent 2	Respondent 3	Respondent 4	Respondent 5

1. With regards to the ICT4D project that you are involved in, what is your understanding of the needs of the community?	My understanding of the community needs is probably limited... I think I understand their ICT needs but not the rest.	Not sure other than that a needs analysis was conducted and it was determined that ICT is important together with some basic services.	I think people need infrastructure, a good transportation system, clean environment and a market place where they can trade anything they want.	(Without sounding too academic on this) The needs of the community are ultimately to live happy, fulfilled lives (a la Maslow's hierarchy of needs). That of course typically then breaks down to all sorts of different primary needs. But in our project, the needs that we are trying to address and meet are basically information and communication needs: - having access to the right, relevant information - having access to communication services - having access to various (knowledge economy) opportunities - being empowered (through IT skills) to leverage the available opportunities	Everybody needs to be computer literate to: 1) use computers themselves and take advantage of the opportunities offered by new technologies and 2) demistify the sense of exclusivity computer use carries. In other words, "feel equal" to people they see using computers for work every day. Starting with teachers is an obvious choice, as they will trickle it down to their students and from there ICT skills will spread in the community. Basic functions (word processing, spreadsheet) are important for productivity, but the Internet is the real game changer. Networked individuals, either through computers or mobile phones, can organise their life better and more efficiently. At this stage, the real need is knowing what is possible through ICT, so in a sense we need to "create a need" in marginalised communities.
--	--	---	--	---	--

2. There are two fundamental approaches to ICT4D. One approach is called the "top-down" approach, in which outsiders who wish to help poor communities arrive with ideas of what help is needed. The other approach is called the "bottom-up" approach, in which outsiders who wish to help poor communities source ideas from within those communities as to what help is needed. How would you describe the approach used in the project that you were involved in?	I would like to think it is bottom-up. But honestly, I would think it is probably a combination of both approaches.	In the beginning it may have been a top down approach. But overtime the community has gotten more involved leading a combination of both approaches.	I would say it's a combination of both because there is the Alice Residents Association, Alice Business Community, Nkonkobe Municipality, Aspire, Fort Hare as well as individual community members.	Our approach is more accurately described by the living lab model - in which there is co-creation (with the community) of solutions to address the needs in the community. The other model that also accurately describes our approach is collaborative innovation (as per Richard Heeks' classification of ICTD innovation approaches). In essence, what typically happens is that the IT practitioners (for lack of better word - don't want to call them IT experts or outsiders) engage with the community to identify the needs on the ground and sometimes the needs emanate from an analysis of the situation in the community. Because of the limited awareness of the possibilities that IT provides, the process of designing the solutions or the conceptualization of the solutions is then led by the IT practitioners. So the approach is more of a hybrid of top-down and bottom-up.	Bottom up is the way the Internet developed to a large extent. It is obviously the one projects claim to follow including the one I was involved in. In reality, it is more difficult that it seems to follow a bottom up approach. Deadlines, directives from funders, research trajectories and financial constraints all function better within the top down approach which shaped their organisation. Enforcing a truly community driven project requires a conscious and constant effort, as well as compromise. Technical and management people, often in charge of ICT4D projects, are often not sensitive to this aspect and, when the deadline approaches, in reality they switch to a top down approach. I would say in my experience the members of the community retained a fair say in how things were done and play an active role. Requiring a bottom up contribution in terms of commitment is probably the most important aspect of the bottom up approach.
---	--	---	---	---	---

3. Following up on the above question, would you say the approach fostered or hampered the success of the project?	I think a combination of both approaches has actually been accepted well.	It is hard to tell if at the moment if ICT has been implemented well.	I believe the approach that was used is as funding was also obtainable from the government based on the reports. But progress has been slow in terms of ICT because ICT is not one of the top priorities of the project as for example agriculture.	The engagement of the community in identifying needs and coming up with solutions has definitely been critical to the success of the project	Definitely fostered. paradoxically, the ideology behind it contributed to the success of the project, regardless of whether it was actually implemented or not. In other words, a conscious effort to involve the community led to success, regardless of whether the approach was truly and solely bottom up.
4. Some authors suggest that in order to properly determine community's needs there need to be a balance between the 'top-down' approach and the 'bottom-up' approach. However, some authors feel that the 'bottom-up' approach should be given priority. They argue that ICT4D projects face challenges because not enough time is spent seeking and understanding the perspectives of the people from the community. What are your views in this regard?	In theory the bottom-up approach is probably the best option. But realistically it seems as if the ideas need to be planted within the community to help them understand the options available to them... these ideas are obviously influenced by the researchers.	I don't think it is the case that the community is not consulted. I think there is lack of an effective way to contact as many people in the community as possible. Those that participate their views are heard and appreciated.	Before the project began an analysis was carried out and a Status Quo report as well as a Business Case report were subsequently published. Some local organisations were consulted during the analysis. So I believe a fair amount of time was spent seeking opinions of views of locals.	That is the goal of ICTD in a sense, for communities to be able to come-up both with the needs and the solutions themselves - that is the "grassroots innovation" goal that typically comes after "collaborative innovation", however in order to get there the community should have been extensively empowered with the relevant IT skills (and other supporting skills). So I see the approach is being determined by the readiness/empowerment level of the community rather than an objectively pre-determined approach. As far as purely identifying the needs is concerned, the process fundamentally has to be bottom-up, because its the needs of the community, and therefore they should emanate from and be derived from the community. Notwithstanding the possibility of further analysis that I alluded to earlier, which allows for identification of secondary needs.	I would agree with the first statement (a mix is needed). If you think about McLuhan's "faster horses", users do not necessarily know what they want and technology often responds to needs which were not there before. It is presumptuous to think one can understand what ICT can and will be used for in a context where it has never been used, and of which little is known. Definitely too much time and energy is spent trying to assess the needs as opposed to trying things out and experimenting. While the first approach looks better on funding proposals and reports, I believe it actually stifles innovation.

5. Could you specify the technologies that were being implemented in the ICT4D project that you were involved in?	They were talking about an “information library” which would allow members to use PCs to access the Internet. Additionally, there was talk of setting up a wireless network so those with cell phones could access the network.	Computers with Internet connection mainly. That was the idea. Of course a suitable structure to house the computers also has to be identified.	There was talk of computer labs. As of recently there is also talk about how cell phones can be used.	(that could be very broad, but they include) - Networking technologies : WiFi, WiMAX, ... - Hardware technologies : server clusters, thin-client computing, ... - Software technologies : Edubuntu, LTSP, various *nix servers, ecommerce, elearning, ...	Mainly computer laboratories in schools, connected wirelessly (WiFi) to the University.
6. In your ICT4D project, what do you think the community can do in order to generate enough income to sustain the facilities and equipment once the project is fully implemented?	They will need to find sponsors – or ask local government to help? There was talk of charging the Users, the amounts suggested were nominal – not enough to sustain the project.	Users could be charged for using the facilities. If the money does not cover all costs they could seek extra funding from the local municipality.	The local municipality needs to have ICT agenda so they can include ICT funding in their budget proposal to the government.	One of the objectives of the project is to implement solutions that support the financial activities in the daily lives of the community (e.g. ecommerce to support the arts and crafts entrepreneurs, etc). Those kind of services can provide some revenue to the project. There are various billing schemes that can also be implemented to charge the community for the utilization of the resources.	Save money for travel to town, printing, bank charges, useless bureaucracy. A lot of money spent on campaigns of various types could also be better used to provide information through ICT. Since there are savings and are due to improved efficiency, they are virtually impossible to quantify. If the goal is simply to include marginalised communities in the formal economy, that is really a myopic way of looking at ICT4D. Still, there are obviously jobs one can do online and skills one needs to look for work somewhere else.

7. How was your ICT4D project managed in terms of planning, resource allocation, time allocation and coordination of tasks?	It was managed enthusiastically but as people volunteered their time, capacity was an issue.	The project was had a steering committee headed by Aspire and the local municipality. It was later joined by a Fort Hare representative.	The municipality which was to take the lead lacks the capacity. Others are partially involved and there is a lot of divisions opinions that remain unresolved.	The project consists of a number of committees that are responsible for different sections and components of the project. Primarily the project's high-level goals and objectives are driven from the Steering Committee of the Centre of Excellence. There is also a "committee" in the community responsible for the on-the-ground daily doings. The Centre of Excellence and the supporting SiLLMU office, provide the bulk of the management and coordination roles in the project.	It was driven by a group of young researchers and students with funding from a research unit. It was a fairly equalitarian group with no specific hierarchy. Different people contributed according to their expertise.
8. Literature shows that ICT4D projects are typically a joint effort between several stakeholders. In your involvement in an ICT4D project did you find any problems regarding a common understanding of the role of ICT in the development, the community needs, and the goals?	Yes, of course. Some just want to donate equipment (PCs) and they expect others to do the work. Then when you make suggestions they have their own agenda of donating their PCs and feel their agenda is primary yet they had not yet met with the community	The common understanding was that introducing ICT is part of development. But there was no common understanding what to do or how to go about it and this resulted in a lot of suggestions and debates.	Other the big picture of establishing a knowledge economy, there were hardly any other issues where common understanding was achieved.	The stakeholders in our eco-system have fairly diverse goals in their involvement with the ICTD project. Academia is interested in research and development, Private business is interested in product development and market exploration, Government is interested in service delivery, and the Community is interested in the solutions and opportunities afforded by the project. So, essentially varying goals for each of the stakeholders but all achieved through the synergy of collectively undertaking the ICTD project.	Yes. Academics needed to shape this as a research project in order to justify the funding. Funders were happy with the publicity . Community members showed mixed attitudes, some truly committed and some trying to see what was in it for them. In fact, some academics displayed a similarly selfish orientation. All in all, however, I would say we had a good general understanding and good levels of communication.

9. Literature states that frameworks and models used to implement ICT4D projects in other areas cannot be used in other different areas without being modified because of the differences in contexts. What is your view regarding this assertion?	Context is very important and I agree with the statement that modification will be required to suit the community.	Absolutely. Models used in other areas cannot be directly transferable because there is different existing infrastructure, different needs and different economic setup.	It is true that there is no one size fits all solution. It wouldn't work.	True, there is a need to adapt the best practice and lessons learnt for other context in order for them to be applicable, relevant and sensitive to the context.	I agree. ICT in itself is as much part of the system of values and practices which creates inequality as it is a possible solution to such inequality. Adaptation is needed to get the technology to work but also to consciously reduce the gap.
10. Some observers state that the ICT policies put in place by the South African government are conducive for ICT4D. However, they point out that the policies are not adequately translated into practice. What ICT policies would like to see being implemented soon in order boost ICT4D in South Africa?	Walk the talk, not just talk the talk. In other words, a lot of it is just theoretical.	I would like to see ICT made available in education as much as possible.	The problem is that plans are made at government level but implemented by municipalities. However municipalities have to deal with basic problems on the ground instead of big government plans. So the overlap of responsibilities creates a weak link in the implementation of policies.	Not being too conversant on the specific government policies, it would be good to see ICTD being given a high priority status and adopted as one of the governments programmes for community development and poverty alleviation.	Implementing the White paper on e-Education would be great, but in itself is so unrealistic that it should be taken as a good intention, not a commitment. It takes real effort and a real will to establish computer labs in every school and equip every teachers with a laptop and every learner with a tablet. That would work and, ultimately, save money on several fronts.

11. It is often stated that one of the problems in ICT4D is that the link between ICT and development is not well understood. Could you please specify the role that ICT plays in the developmental project that you are, or have been involved in?	We are trying to bring access to everyone, it does not matter where one is located. But with this, education of Users is paramount.	Perhaps it is true as the tendency is often to talk high-tech. There is general understanding of what ICT can do, stuff like provide information and opportunities. However the specifics are difficult to mention.	It is true. That is why the municipality there has no ICT agenda. The only thing we understand is that a knowledge economy is the future. There is not plan how computer labs will help achieve this.	My view and notion of development is strongly aligned to the Amartya Sen's Capability Approach and as such enhancing peoples capabilities is as critical component development. ICT is positioned squarely to enhance peoples' and communities' engagement in society (particularly in the current information/knowledge society), by having access to information, resources, opportunities, etc. That is therefore fundamentally the role of ICT in development.	N/A
---	--	--	--	---	------------

12. Some ICTs have been found to have unintended successes in development. For example a mobile phone application designed to give farmers access to markets may not increase their sales, partly because that is dependent on their maximum production. However the application may allow a farmer to find a buyer without having to travel to the market, therefore saving the farmer travelling costs and inconveniences. In your opinion, should ICT4D projects be evaluated strictly based on their initially stipulated goals or should other unintended outcomes be acknowledged?	No, innovation and creativity should be encouraged and any success measured.	I don't know if it is a good idea to have strict evaluation criteria. But if people can more than what is expected with technology that should be considered success.	If technology works it's fine. However it works is not important. If it helps achieve the goals then it is working fine.	In doing impact assessment and evaluation, its never sufficient to just consider the initially stipulated outcomes and outputs. Loosely borrowing from economics concept of "externalities" : ICT projects have both positive and negative externalities that contribute towards the overall success / failure of the projects and that, as far as possible, have to be acknowledged in undertaking project assessment. Furthermore, the outcomes of ICT project can be both tangible and intangible, leading to a great difficulty in attempting to quantify the intangibles. So in general the unintended outcomes have to be acknowledged - but that specifically depends on the goal of the evaluation in the first place.	The key word is efficiency. While this has been happily exploited for commercial gain by industries and is beginning to be available to middle people, members of marginalised communities still live in a very inefficient way. I am not talking just about saving time, but truly have access to information and services which can make life better in every way.
--	---	--	---	--	---

13. Are there any views that you would like to express regarding the use information technologies in development efforts that may be closely associated to this questionnaire but not covered?	There are a few problems I have noticed over the years for ICT4D projects. To summarise: • The project must be aligned to the community's needs. • The community must "support" the project. • Sustainability of these projects must be improved upon.	None	I think the improvement that ICT can bring must speak for itself. The idea of a knowledge economy must not be limited to computers. Also, agents who deal with development must be educated on ICT as ICT is still not included in most developmental studies curriculums. People leave rural areas once they gain skills.	None	None
---	---	------	--	------	------

Table 1: Raw empirical data from stakeholders from organizations coming from outside communities

Table 10: Raw empirical data from community members

Question	Respondent 1	Respondent 2	Respondent 3
1. How would you define development?	Access to basic service such as housing and clinics and good roads. With regards to ICT, it means computer access.	In my point of view it means developing the people in one way or another like skills for example. Also in the sense of developing the area like roads.	I would say it when people have houses, enough food and can afford education.
2. What would you say are the biggest needs or challenges that you community faces?	I would start with lack of jobs. People are also hoping that the Siyakhula project can create jobs or make them employable.	No one goes to help in the rural areas. It is expensive for people from rural areas to commute to town for training.	I think the biggest needs for people in my community is a source of income. the unemployment is too much and there no jobs in the area.
3. In your opinion, how do you think information technology can be used to	It can provide training of computer skills. The youth can come browse	There can be an information centre where people can come and find information.	I think it would give people an opportunity to see other things. Even the things they

help with these needs or challenges?	for jobs and other opportunities.	People can also be taught some skills. People can learn about opportunities and government initiatives that can help them.	do every day they can learn to do them better from the internet.
4. As a community member, do you feel that you are made aware of developmental projects that involve information technologies in your area, aprticularly those that involve information technology? Do you feel encouraged to participate? Would you suggest any improvements in order encourage community participation?	Yes of course. I was introduced to it through my school and other community members are always informed of meetings. People in the community are aware of the initiative.	Yes definitely we are made aware. When there will be a meeting counsellors are informed who then inform their constituents. People are interest but they are always disappointed. They always expect something when a meeting is called but then nothing happens especially with the computers here.	Yes I was very aware. Everyone was talking about the project. It popular in my community and everyone is encouraged especially the youth.
5. If there are any information technology facilities in your area how have they benefited the community? If not they have not been beneficial why do think that is the case?	There are computer labs in 11 schools at present. They have been very beneficial. For example people had to take a taxi to town to send faxes. Now they are to fax their things here. People know they can find information from the Internet.	There is only one internet café in town and it is publicly owned. There are public places where people can use computers for free.	Yes there are computer labs in schools. They are used to provide skills to the learners as well as adult community members. It is good because it is also free
6. What specific technologies would you say are needed in your	I would say we need more computers. The community recently	I would say we need computers. We need the Internet too. All the stuff	I think my community needed the computers. More computers

community?	bought another printer.	like printer and scanner would be nice to have people can really use that.	would be good.
7. It is said that information is becoming more important to everyone in the world. It is also said that people in urban areas have more access to information than people in rural areas. What type of information would you say members of your community are deprived of?	I would say its information about jobs, sports, business and educational information. In my experience that what people come and search for as opposed to information about health for example.	People need information about everything. For example if you want to sent you child to a university you don't have to call or visit that university to enquire about course, you just visit the website. People need information about job opportunities, training opportunities, everything.	I think people in my community were deprived of all the information that is out there. For example when they have problem they didn't know how to find a solution.
8. Typically information technology initiatives in rural communities are funded by external donors who eventually stop. In your community, how would suggest income can be generated in order to maintain information technology facilities?	I would suggest that people pay a fee to use the computers. This was once agreed on although at the moment they are used for free.	I think the municipality should help with funds because people are poor here. The university should also help with skills. Private business can also help fund the project.	The think the involvement of companies like Telkom and the government is good. I think all those things would be too expensive for the community to maintain from their pockets.
9. Regarding the introduction of information technologies in your area, are there community members who are getting the opportunity to learn about	Yes I am one of them. I also conduct lessons to teach other how to use computers. We also have a technician we contact at Rhodes when we have a	At the moment there has not been any technology introduced. We have identified a building where computers can be housed but feedback is	Yes including me. Old and young everyone is learning new computer skills. The computers are now available in many schools too.

the technology in order to maintain and improve it themselves in the future?	problem and I have learnt from the technicians instructions to solve some problems.	needed from government as the building is owned by the government.	
10. Are there any views that you would like to express regarding the use information technologies in development efforts that may be closely associated to this questionnaire but not covered?		No I think we have covered nearly everything.	I am hoping that this project can help create jobs and business opportunities in my community because people suffer there because of unemployment.

Table 2: Raw empirical data from community members