

ICTs for Inclusive Communities in Developing Societies

ICTs for Inclusive Communities in Developing Societies

Edited by

Jacques Steyn and Darelle van Greunen

Cambridge
Scholars
Publishing



ICTs for Inclusive Communities in Developing Societies

Edited by Jacques Steyn and Darelle van Greunen

This book first published 2015

Cambridge Scholars Publishing

Lady Stephenson Library, Newcastle upon Tyne, NE6 2PA, UK

British Library Cataloguing in Publication Data

A catalogue record for this book is available from the British Library

Copyright © 2015 by Jacques Steyn, Darelle van Greunen
and contributors

All rights for this book reserved. No part of this book may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording or otherwise, without the prior permission of the copyright owner.

ISBN (10): 1-4438-8081-7

ISBN (13): 978-1-4438-8081-7

TABLE OF CONTENTS

List of Figures and Tables.....	viii
Contributors.....	xi
Introduction	xviii
Jacques Steyn	
Theory, Models and Method	
Chapter One.....	2
Digital Technology for Inclusion: A Critical Discourse Analysis of Urban Poor Groups in South Africa	
Maria Rosa Lorini, Izak Van Zyl and Wallace Chigona	
Chapter Two	26
Investigating Ways to Assess ICT4D's Impact on the Larger Community	
Marita Turpin and Joan Mwenda	
Chapter Three	45
An Experimental Methodology to Promote and Evaluate the Use of Community Networks for Civic Engagement	
Mònica Garriga, Jorge L Salcedo, Narcís Vives and Roc Meseguer	
Chapter Four.....	72
Introducing a Maturity Model for ICT for Development Projects	
Aaron Ciaghi, Adolfo Villafiorita and Lorenzo Dalvit	
Chapter Five	84
A Conceptual Framework for ICT4D	
Judy Van Biljon and Trish Alexander	
Chapter Six.....	107
Claims of Mobile Phone Use by Kerala Fishermen Not Supported by Fieldwork	
Jacques Steyn and Mohan Das	

Society and Communities

Chapter Seven.....	144
Towards Self-Sustaining Community Networks in Rural Areas of Developing Countries: Understanding Local Ownership Carlos Rey-Moreno, Amalia G. Sabiescu and Masbulele Jay Siya	
Chapter Eight.....	167
Enabling Intra-Community and Inter-Community Support in <i>Lean</i> Societies Laurie Butgereit	
Chapter Nine.....	180
Migrants, Mobile Finance and Marginalization: Exploring Remittance Processes and “Ghettoization” in Singapore Narendiran Sundararajan, Mohamed Sirajudin, Mohamed Jinnah and Arul Chib	
Chapter Ten	201
Developing User Security Metrics towards Awareness Creation Fungai Bhunu Shava and Darelle Van Greunen	

Generations

Chapter Eleven	226
One Year On: A Longitudinal Case Study of Computer and Mobile Phone Use among Rural South African Youth Lorenzo Dalvit and Fortunate Gunzo	
Chapter Twelve.....	238
Do Mobile Phones Enhance The Quality of Life for the Elderly? Brett Mealor and Jean-Paul Van Belle	

Gender

Chapter Thirteen	272
Women, Participation and Design in ICT4D: Addressing Barriers Using a Co-Creation Approach Ronel Smith	

Chapter Fourteen	297
Translating the Need for Social Support Services Utilizing ICT: Case Study of Rural Women in Limpopo Province Manti Grobler and Carina De Villiers	

Education and Health

Chapter Fifteen	320
The Integration of ICTs in Marginalized Schools in South Africa: Considerations for Understanding the Perceptions of In-Service Teachers and the Role of Training Kanya Nkula and Kirsten Krauss	

Chapter Sixteen	344
Personal Health Records in the South African Healthcare Landscape: A SWOT Analysis Avuya Mxoli, Nicky Mostert-Phipps and Mariana Gerber	

Index	358
-------------	-----

LIST OF FIGURES AND TABLES

Figures

Figure 2-1 DFID livelihoods framework

Figure 3-1 Communicative Ecology Network Profile

Figure 3-2 Geolocation Platform

Figure 3-3 Email exchange intensity over time

Figure 5-1 Initial conceptual framework

Figure 5-2 Initial conceptual layout

Figure 5-3 Updated conceptual framework

Figure 7-1 Conceptual model for examining the determinants, mechanisms and effects associated with the development of a sense of ownership

Figure 8-1 Three examples of Communities on Fire

Figure 10-1 How to influence user behavior

Figure 10-2 Security awareness impact on other security aspects

Figure 10-3 Where users learn about security policies

Figure 10-4 Knowledge of policy requirements

Figure 10-5 Victims of security threats

Figure 12-1 The Choice Framework

Figure 12-2 Proposed Research Framework

Figure 12-3 Length of Mobile Phone Use

Figure 12-4 Mobile Phone Functionality Use

Figure 12-5 Other quality of life impacts of mobile phone

Figure 13-1 Co-creation in a research project

Figure 14-1 Illustration of the data analysis process with reference to qualitative content analysis steps

Figure 14-2 Unpacking the answer to the primary research question using an adapted Capability Approach Framework

Figure 15-1 A Framework on Essential Factors for ICT Integration in Education in Developing Contexts

Figure 16-1 Willingness to pay for PHR use

Tables

Table 1-1 Summary of the main findings

Table 21 Elements of the Social Autopoiesis Framework

Table 5-1 Subject areas encountered in the ICT4D landscape

Table 5-2 Research domains encountered in the ICT4D landscape

Table 5-3 Domains

Table 5-4 Research Focus Areas

Table 5-5 Research Paradigm

Table 5-6 Research method

Table 5-7 Data collection method

Table 5-8 Data and analysis

Table 5-9 Theory

Table 5-10 Disciplines

Table 5-11 Weighted Cohen

Table 10-1 Security threats

Table 10-2 Affiliations of respondents

Table 10-3 Bottom-up approach employed for analysis of results

Table 10-4 Knowledge of policies

Table 10-5 Calculated risk rating for security policy awareness

Table 10-6 Knowledge of security threats and associated risk rating

Table 10-7 Frequency of use of specific security technologies

Table 10-8 Security awareness metrics

Table 12-1 Item Analysis – Cronbach Alpha

Table 12-2 Factor Analysis–Principal Component Analysis (Varimax normalised)

Table 12-3 Regression analysis for QoL (reduced model)

Table 13-1 Summary of barriers preventing rural women from accessing ICTs

Table 13-2 Factors to consider when implementing ICT4D projects aimed at women

Table 13-3 How co-creation can address barriers to ICT use by rural women

Table 13-4 How the researchers addressed the issues raised in this article

Table 16-1 SWOT analysis

Table 16-2 Results of SWOT analysis

Table 16-3 SA Household Internet access by place of access

CONTRIBUTORS

Jacques **Steyn** is Head of the School of IT at Monash South Africa, and founder and Director of IDIA (International Development Informatics Association) which provides a platform for sharing research findings in the field of ICT4D. He was Editor-in-Chief for a set of books on Development Informatics, *Development Informatics and Regional Information Technologies: Theory, Practice and the Digital Divide*. He was also editor of *Structuring Music through Markup Language: Designs and Architectures*.

Darelle **van Greunen** is a Professor in the School of ICT and the Director of the Center for Community Technologies at the Nelson Mandela Metropolitan University in South Africa. She holds a PhD in Computer Science supported by several other degrees in multiple disciplines ranging from African languages to multimedia. Her research focuses on using technology as an enabler in social and rural development, whilst considering the user experience and human computer/technology interaction. She serves on several international advisory boards and is a frequent keynote speaker at international conferences.

* * *

Trish **Alexander** is Professor Emeritus of the Department of Informatics at the University of Pretoria, and Professor Extraordinarius of the School of Computing at the University of South Africa. In recent years she has had several publications in the field of ICT4D.

Laurie **Butgereit** wears many hats. She is a Research Associate at Nelson Mandela Metropolitan University in South Africa. She supervises PhD candidate students at Sudan University of Science and Technology. She is also employed in the mobile telecomms arena in South Africa doing technical Java development both on the Android side and the Enterprise side. This diverse environment gives her insight into how technology can be used to help solve challenges in many areas of the world.

Arul **Chib** is Associate Professor at the Wee Kim Wee School of Communication and Information, Nanyang Technological University and Director of the Singapore Internet Research Centre. He pursues action-oriented research in varied cross-cultural contexts. His research focuses on the role of mobile phones in (a) healthcare systems in resource-constrained environments of developing countries, and in (b) transnational migration to developed countries. Dr. Chib has led the SIRCA programme since 2008, mentoring 30 emerging country researchers in Asia, Africa and Latin America, leading recently to a volume (Springer, 2015) on the impact of research in influencing policy, practice, and public opinion.

Wallace **Chigona** is a Professor of Information Systems at the University of Cape Town, South Africa. He holds a PhD in Computer Science from the University of Magdeburg. His research focus is on the use of ICTs for human development. He has researched on the use and impact of ICTs amongst the disadvantaged communities in different African Countries. He has published widely in the area of ICT4D and is currently on editorial boards of Electronic Journal of Information Systems in Developing Countries and the African Journal of Information Systems.

Aaron **Ciaghi** (PhD) is a researcher at Fondazione Bruno Kessler, Trento (Italy). His interests include Agile Software Development, Web Technologies, ICT for Development, Living Labs, Social Innovation and Project Management. He has also published on software metrics applied to the analysis of laws, Living Labs and eGovernment.

Lorenzo **Dalvit** is the MTN Chair of Media and Mobile Communication in the School of Journalism and Media Studies at Rhodes University in Grahamstown (South Africa). His areas of academic interest include ICT-for-development, hyperlocal media, mobile services and localisation in African languages. He co-authored over 100 publications and has supervised more than 30 students across various disciplines (Media Studies, Education, African Languages, Computer Science). He is involved in various ICT-for-development initiatives and international collaborations.

Mohan **Das** (PhD in micro electronics) is a senior lecturer at Monash South Africa. He has previously published on fault tolerant microchip designs, and on Schottky Barrier Diodes (SBD) on silicon. He is a native of Kerala, taught in a few South African universities for several decades, and is retiring to Kochi, Kerala (India).

Carina **de Villiers** is a full professor at the University of Pretoria, South Africa. She obtained an MEd (Didactics) cum laude, and PhD (Informatics) degree. She has co-authored 9 books, 29 articles in peer-reviewed international journals and delivered more than 100 international and national conference papers on different topics in IS Education. She is a member of several international bodies and serves on a number of editorial and advisory boards for journals.

Mònica **Garriga** is a researcher at IGOP (Autonomous University of Barcelona) and at 'Itinerarium' (Information Technology and Services) exploring the use of mobile and GIS technologies to foster transformation, through education, local government and civic engagement. She is a former foreign correspondent with a degree in Law, a degree in Arts and a Masters in Communications. She has published on the use of community networks for civic engagement.

Mariana **Gerber** is an Associate Professor at the Nelson Mandela Metropolitan University (South Africa) and holds a PhD-degree. Her research interest is in the field of Information Security Management and Governance with a list of published journal articles.

Manti **Grobler** is a PhD (Information Technology) student at the University of Pretoria in the Department of Informatics. She holds a position as an executive director at EY Digital Advisory. Her work and studies build on her belief that technology contributes to people's experience of the good life and their dignity. She explored this topic in her Masters in IT (cum laude) with the research viewed through the lens of the capability approach as defined by Amartya Sen.

Fortunate **Gunzo** is a PhD student in the Education Department at Rhodes University in Grahamstown, South Africa. Her PhD focuses on ICT in South African marginalised classrooms. Her research interests include ICT for Development, ICT in Education and mobile phones in rural South Africa.

Mohamed Jinnah bin Mohamed **Kassim** is a graduate student at Nanyang Technological University (Singapore).

Maria Rosa **Lorini** is a PhD student in Information Systems at the University of Cape Town, South Africa. Her research field is on communication and information technologies for community empowerment,

in particular within groups and social movements of urban disadvantaged areas. She holds a University Degree in International Political Sciences and a Master in Human Rights and Conflict Management at the Scuola Superiore Sant'Anna, Pisa (Italy). She worked as communication officer at the United Nations Operation in Côte d'Ivoire and as project manager for a non-governmental organization coordinating programs focused on HIV-AIDS, gender based violence and alcohol and drugs abuse.

Jorge L Salcedo **Maldonado** is researcher at IGOP and Assistant Professor at Universitat Oberta de Catalonia, Spain. He has published on the Internet and political participation.

Brett **Mealor** is a software engineer at Open Box Software with the focus primarily on the creation of custom software solutions. He is interested in how mobile devices and applications can be leveraged to improve the lives of individuals, regardless of their backgrounds.

Roc **Meseguer** is an associate professor in the Computer Architecture Department at the Universitat Politècnica de catalunya (UPC), where he is a member of the Computer Networks and Distributed Systems Research Group. His research interests include socioeconomic-oriented distributed systems, particularly resource allocation for large-scale systems (peer-to-peer, cloud, mobile ad hoc networks, and so on); decentralized systems applied to ambient intelligent; computer-supported cooperative work (CSCW) and learning (CSCL); and community networks based on bottom-up initiatives. He has a PhD in computer science from the Universitat Politècnica de catalunya (UPC).

Nicky **Mostert-Phipps** (PhD) is a Senior Lecturer at the Nelson Mandela Metropolitan University, Port Elizabeth (South Africa). Her research area is health informatics, specifically focusing on the role of Health Information Technologies (HITs) in improving informational continuity of care. She is a National Research Foundation (NRF) rated researcher and a council member (Vice President) of the South African Health Informatics Association (SAHIA). She has published papers in national and international conference proceedings and journals, mainly focusing on factors that should be addressed to encourage the adoption and meaningful use of HITs in the South African healthcare landscape.

Joan **Mwenda** is a Business Solutions Consultant at Business Systems Group (BSG) in Johannesburg (South Africa) and currently enrolled for her MCom Informatics at the University of Pretoria.

Avuya **Mxoli** is currently conducting research at the Council for Scientific and Industrial Research (CSIR) in Pretoria, South Africa, and an IT Master's student at the Nelson Mandela Metropolitan University in Port Elizabeth (South Africa). Publications centered on the theme of health informatics, more specifically Personal Health Records and their adoption in South Africa. Subthemes relate to benefits and security issues of health records, as well as storing of records using Cloud Computing services.

Carlos **Rey-Moreno** is Senior Research Assistant in the Department of Computer Science at the University of the Western Cape (South Africa). He has published several articles on society and technology.

Amalia G. **Sabiescu** is a Senior Research Assistant affiliated with the School of Art and Design at Coventry University, UK. Her research explores the interdisciplinary area situated at the interface between information and communication technologies (ICTs), culture and development studies. Questions of agency in technology appropriation and usage, collaboration, co-creation, creative engagement with digital media, and narrative forms of expression are key topics in her research, transcending disciplinary boundaries. Amalia holds a Ph.D. and an M.Sc. in technologies for communication from the University of Lugano, Switzerland.

Sirajudin **Salman** is a graduate student at Nanyang Technological University (Singapore).

Fungai Bhunu **Shava** is a lecturer in the Department of Computer Science at the Polytechnic of Namibia. She is a PhD student with Nelson Mandela Metropolitan University in South Africa. She has interests in information security, user-experience, user behaviour and HCI in underserved communities. She holds an MSc Computer Science from the University of Zimbabwe.

Masbulele Jay **Siya** is Principal Local Researcher in the Department of Computer Science at the University of the Western Cape (South Africa). He has published on wireless mesh networks, local ownership, and community-based solar power revenues.

Ronel **Smith** is Principal Technologist at the CSIR Meraka Institute (South Africa). She has published several papers on different aspects of ICT4D and vulnerable communities, including ethical issues, gender, and living labs.

Narendiran **Sundararajan** is a graduate of Nanyang Technological University (Singapore), and a research professional involved in technology-business incubation and assessing ICT trends in emerging markets (particularly India).

Marita **Turpin** is a lecturer in Information Systems at the University of Pretoria, South Africa. Her research interest and publication topics include ICT4D, systems thinking and decision-making. Prior to lecturing, she worked in operations research and qualitative decision support at the Council for Scientific and Industrial Research (CSIR) in Pretoria (South Africa).

Jean-Paul **Van Belle** is Professor in the Department of Information Systems at the University of Cape Town, and also Director of the Centre for IT and National Development in Africa at the same university. He has published more than 40 refereed journal articles, more than a hundred peer reviewed conference papers, as well as several book chapters. He was co-editor of the book *Development Informatics and Regional Information Technologies: Theory, Practice and the Digital Divide - Vol 2* (2013), and co-author of the book *Discovering Information Systems – An Exploratory Approach* (2003).

Judy **van Biljon** is a professor in the School of Computing at the University of South Africa. She spearheaded the introduction of Development Informatics (ICT4D) as a research theme at this university and leads the ICT4D Research Flagship. The current focus of her research is the use of mobile technologies for knowledge creation and transfer especially in developing communities. Her research has contributed to the existing body of knowledge in the disciplines of Information Systems and Human-Computer Interaction for Development in terms of mobile technology adoption, usability and user-experience evaluation methods and knowledge visualisation for teaching and learning.

Izak **van Zyl** has a PhD in Communication Science at the Università della Svizzera italiana, Switzerland. Following a postdoctoral fellowship at the University of South Africa, he was appointed an Educational Technologist

at the Cape Peninsula University of Technology in the Centre for eLearning, in 2015. He has a strong publication record in the area of educational technology and ICT4D. His other research interests include digital anthropology and media, the philosophy of Information Systems, and design anthropology. Methodologically, he is interested in digital ethnographic, participatory and meta-analytic approaches.

Adolfo **Villafiorita** leads the ICT4G Unit of Fondazione Bruno Kessler. He has an extensive background in the management and development of software systems. He has worked in several technology transfer and industrial projects in IT-related domains, related to the validation of safety critical systems and to development of IT systems in developing countries.

Narcís **Vives** is the President of Itinerarium Foundation. Cofounder, in 1991, of iEARN (International Education and Resource Network) the world's largest non-profit global schools network to enable teachers and youth to use digital technologies to collaborate on projects that enhance learning and make a difference in the world. Co-founder, and director of the Atlas de la Diversidad network, which started in 1996 as a European Union project within the @lis Program involving 1500 schools from 21 different countries. Selected as an Ashoka fellow social entrepreneur for his commitment to educational change and the creation of innovative and social educational networks.

INTRODUCTION

Globalization, which could be argued to have begun when Europeans began colonizing the world, received an information and communication technology (ICT) boost in the 1990s. First the World Wide Web began to penetrate regions that in the past were poorly serviced by communication technologies. Then, since the new millennium, mobile communications exploded, which overcame the lack of wired network infrastructure in developing regions. The new mobile age enables communities previously at the wrong side of the digital divide to become connected – more so than with the wired connections of the past. It is against this background that ICT4D (ICT for Development) functions. However, ICT4D is not only about technology. It is also about the users of technologies.

There is considerable literature about the digital divide. This divide, however, is not the only divide that should be considered when technologies are deployed as new artifacts in communities who never had them before. The social divides are perhaps even more relevant than the technological divides. Even if deployed technologies operate technically optimally, there is no guarantee that the deployment is successful with reference to use. Social divides include those based on social position, power relations, gender, age, educational levels, and so forth. Specialized social communities ranging from health care, education and governance, to family life and creative activities who benefit from being connected also need to be understood against their cultural backgrounds.

Technical challenges certainly exist. Being connected in developing regions does not necessarily mean the same as in highly developed societies. Connectivity in New York is a very different matter to connectivity in a deep rural area, or even urban area in a setting that lacks infrastructure, energy, and supporting systems. As recent as the turn of the millennium New York City had more landline phones than the entire African continent. Support and maintenance systems are often not in place, which are obstacles in the sustainability of ICT4D projects. But the technical challenges seem to pale compared to social challenges. Challenges are multi-disciplinary, associated with the engineering, application and adoption of ICTs in developing societies and/or for

development. There are also “softer” challenges from the project's point of view, such as implications for design, usage, policy, and practice. Finally, there are user challenges that include the entire gamut of social properties. Language as well as device illiteracy, gender roles, local power struggles, lack of understanding the functions of technologies are just some of the challenges.

Given these complexities, how is technology deployment in developing cultures and communities to be understood? Classes of understanding often seem to depend on ideology rather than solid research methodologies. Despite mounting evidence against the paradigm of economic development, it still dominates in practice. Slowly newer approaches are filtering through ICT4D literature that redefine key concepts such as welfare, capabilities, ownership and a host of others that are not technological, but rather social, and extremely relevant in the deployment of technology. ICT4D is a socio-technical discipline.

In Africa and Latin America there is the perception that projects aimed at uplifting perceived divides are neo-colonial trojan horse invasions. This view is confirmed when projects are initiated and driven by donor agencies, typically from the *north*, as top-down initiatives. Most conferences and journals are also driven by the north, which suggests that ownership does not reside with those who are supposed to benefit from projects. To address this perceived problem, more recently there has been a shift in thinking towards concepts such as co-creation and bottom-up participatory approaches.

Just shy of ten years ago, the International Development Informatics Association (IDIA) was established as a platform for academics doing research on ICT and developing communities. IDIA is of the south, by the south, for the south – while “south” is here used as a catch-all word for a class of words referring to regions that lack the privileges of the most developed regions of the world. IDIA is ideology agnostic and participants are from all continents. Over the years of its existence, paper contributions were made from about 40 different countries.

The 8th IDIA conference was held in November 2014 in Port Elizabeth, South Africa, during which papers were delivered addressing some of the issues mentioned above. This volume consists of a selection of the papers of the IDIA2014 conference, some of which have been rewritten for this volume.

The impact of technology, the degree of impact (positive or negative), technology's usefulness or not, and its implementation into complex cultural structures are difficult to understand. The papers in this volume attempt to clarify the complexities to arrive at a better understanding of how technology impacts on societies, especially developing societies, and consequently what role particularly ICT could play in communities to change themselves into contemporary societies – if they wish to do so.

There are five sections in this volume: Theory, models and method, Society and communities, Generations, Gender, and Education and Health.

Theory, models and method

ICT4D does not have a theory of its own, but borrows theories from many other disciplines ranging from sociology, political studies, anthropology, to economics and other disciplines. It is thus not surprising, given the range of contributing disciplines, that an extensive range of scientific methodologies has featured in ICT4D literature. Given its cross-disciplinary nature, this is to be expected. The challenge, though, is to find the most suitable methods for specific contexts. Chapters in this section are attempts on route to a clearer understanding of these complexities.

Maria Rosa Lorini, Izak van Zyl and Wallace Chigona follow a Critical Discourse Analysis in their contribution, *Digital technology for inclusion: a critical discourse analysis of urban poor groups in South Africa*, in an attempt to understand ICT in poor urban groups in South Africa. They conclude that “lack of skills and the lack of knowledge about existing opportunities” prevent members of such communities to use ICTs for purposes other than for personal communications. They propose that projects be designed *for* participation.

In their chapter, *Investigating ways to assess ICT4D's impact on the larger community*, Marita Turpin and Joan Mwenda address the important matter of how to assess the success of ICT4D projects. They consider Sen's Capability Approach, the Sustainable Livelihoods Framework as well as Social Autopoiesis as tools. Their analysis indicates that in ICT4D literature these qualitative tools feature less than quantitative tools, as they are more time consuming and perceived to be complex.

There is ample evidence in ICT4D literature that top-down approaches to project implementation do not work. Over the past number of years several

bottom-up approaches have been proposed. In the chapter *An experimental methodology to promote and evaluate the use of community networks for civic engagement*, Mònica Garriga, Jorge Salcedo, Narcís Vives and Roc Meseguer introduce civic engagement using participatory media in Poblenuou, a suburb of Barcelona. Their tool set includes Content Analysis, Social Network Analysis (SNA), Blockmodeling and Descriptive Statistics, Ethnographic Action Research (EAR), Network Action Research (NAR), and the Most Significant Change (MSC). They noted a slow change of the community from traditionally familiarity with top-down approaches to a bottom-up stance by taking ownership through the use of media as a tool, and more civic engagement.

Aaron Ciaghi, Adolfo Villafiorita and Lorenzo Dalvit propose in their chapter, *Introducing a Maturity Model for ICT for Development Projects*, that present ICT4D research is dominated by social theory which results in the technical aspects being neglected. In particular the project management of many projects “is often unstructured and rarely documented.” They propose a Maturity Model that offers a set of guidelines that could hopefully be used for more efficient resource management.

Given the multi-disciplinary nature of ICT4D, there is no common theory used as basis in this domain. One might say that the discipline reflects a hodgepodge of theories and frameworks, published in more than 40 different journals. Finding papers relevant to a specific topic is a daunting task. In the chapter *Conceptual framework for ICT4D*, Judy van Biljon and Trish Alexander attempt to create a framework for shared terminology that may indicate more precisely the theoretical underpinnings, research methodology, and content and context of ICT4D publications. The advantage of such a system would be to find relevant topics more easily among the tens of thousands of articles published in this domain.

In the field of ICT4D there are ample research papers published in more than 40 journals, and from many different theoretical perspectives and ideologies. A large number of role players on this stage have an activist engagement approach attempting to “uplift” communities through the use of ICT. This results in two problems. On one hand there is the danger of accepting the findings of ICT4D literature, or worse, of mass media publications, at face value without performing more research in an attempt to replicate the research to falsify, confirm, corroborate or justify (depending on one's favorite scientific method) published findings. On the other hand, perhaps due to the perceived life-changing power of ICT on

communities at the wrong side of the divides, the claims of publications regarding the positive impact of ICT on communities are sometimes accepted without scrutiny. According to Jacques Steyn and Mohan Das, in their chapter *Claims of mobile phone use by Kerala fishermen not supported by fieldwork*, a case in point concerns one of the most cited papers in ICT4D literature. The claim promoted by Robert Jensen that fishermen use mobile phones to determine the best market prices along the coast of Kerala, and then sell their catch at those best markets which leads to increased economic welfare, is refuted by the fieldwork and literature study of these authors.

Society and communities

ICT4D ultimately is about communities. Literature in ICT4D has addressed formal and informal communities, ad hoc communities, organizational and social communities, and briefly, any group of people with some common goal, however vaguely defined. In this section investigations are reported of ICT implementations in a diversity of communities. The remaining sections of Generations, of Gender, and of Education and Health also address particular communities, but they are separated from these more general discussions as special cases.

In their chapter, *Towards self-sustaining community networks in rural areas of developing countries: Understanding local ownership*, Carlos Rey-Moreno, Amalia Sabiescu and Masbulele Jay Siya propose that rural communities are typically not aware of the advantages of ICT, or when indeed aware, do not have the confidence to deploy ICT projects, which are most often deployed by external agencies. This leads to a lack of ownership, which in turn results in failure. The authors introduce a model that could be used to analyze and operationalize local ownership.

Laurie Butgereit's paper, *Enabling Intra-Community and Inter-Community Support in Lean Societies*, is about a practical mobile tool that communities could use for information and knowledge access and sharing. The tool was tested in both inter-communities (with support across communities) and intra-community (with support within the community). Butgereit in essence proposes that such tools are useful in any society, and in this sense the term development is redundant and we should, (following Olopade), rather speak of lean societies (in which production and consumption are scarce) versus fat societies (where there is oversupply).

Migrant workers might be considered as communities on the move. The money moved between countries by migrant workers is staggering. In India migrant workers is a major source of the GDP of the state of Kerala. In Singapore migrant workers move USD1.4 billion through remittances. Narendiran Sundararajan, Mohamed Sirajudin, Mohamed Jinnah and Arul Chib investigate the social impact of modern modes of remittances (i.e. mobiles) in their chapter *Migrants, Mobile Finance and Marginalization: Exploring Remittance Processes and "Ghettoization" in Singapore*. They found that even though m-Banking might result in easier and less time-consuming transactions, participants preferred traditional methods that allow more time for socialization at the locations (such as the vicinity of banks) used for the payment process.

The developing world arrived later to the world of connectivity than the developed world. The longer history in the developing world using ICTs brought about higher levels of awareness regarding risks using technologies. Although there certainly are security risks in any context where ICTs are used, the lack of a longer history of exposure to technology risks might result in lower levels of awareness about such risks in developing communities. In their chapter, *Developing user security metrics towards awareness creation*, Fungai Shava and Darelle van Greunen present a case study of the Polytechnic of Namibia and conclude that due to low levels of policy and secure behavior awareness, significant security threats exist in this organization.

Generations

In this section the use of ICT by two groups on the extreme ends on the axis of human life are investigated: the young, school going community, and the elderly.

In 2006 ICT4D projects commenced at Dwesa in a remote rural area on the east coast of South Africa. Projects in the area are well-reported. The main project is known as the Siyakhula Living Lab. A comparative study of ICT use among school children in Dwesa was conducted by Lorenzo Dalvit and Fortunate Gunzo in 2011 and 2012, and reported in their chapter *One year on: A longitudinal case study of computer and mobile phone use among rural South African youth*. They found that the use of ICT and multimedia grew at a tremendous rate during that timespan.

At the other end of the age scale, in their chapter *Do Mobile Phones Enhance the Quality of Life for the Elderly?*, Brett Meador and Jean-Paul Van Belle found that “social media and multimedia had a positive contribution towards the quality of life” of the elderly. The elderly, of course, have not grown up with the more recent ICTs, particularly the world wide web and mobile phones. Although the authors found a positive contribution to life experience, some negative experiences were also reported, particularly unsolicited phone calls and text-based message advertisements.

The impact of ICT cuts across all age groups and across all kinds of communities.

Gender

Considering the large monetary contribution of migrant workers to their home bases via remittances, it is evident that in the absence of their men, women run the homes. In cases where younger women also leave to work elsewhere, the remaining adults are the elderly and middle-aged women. In the chapter *Women, participation and design in ICT4D: addressing barriers using a co-creation approach*, Ronel Smith reports on a project in a remote rural agricultural community in South Africa with the goal to make ICT more accessible to such middle-aged women who have had no exposure to ICTs other than mobile phones. Due to gender biases the design of ICTs do not address the needs of these women, resulting in poor uptake, which in turn reinforces the biased male view that ICTs are not for women. For this project a method of co-creation was followed involving the women in the redesign of an ICT platform.

The well-being of women in a deep rural region was also investigated by Manti Grobler and Carina de Villiers, as reported in their chapter, *Translating the need for social support services utilizing ICT: case study of rural women in Limpopo Province*. Their interest was in finding a conceptual framework that could be used to investigate how to approach a project for using ICT for access to information about government social services. They used Sen's Capability Approach as interpreted by Robbeyns.

Education and Health

Kanya Nkula and Kirsten Krauss investigated the use of ICTs in marginalized schools in South Africa. In their chapter, *The integration of*

ICTs in marginalized schools in South Africa: Considerations for understanding the perceptions of in-service teachers and the role of training, they point out that many schools in South Africa do not have ICTs, but even among those that do have ICTs there are many that do not use technology adequately. They distinguish between schools that integrate ICTs sufficiently in the learning process (generative use), and those that merely teach the use of ICTs, or where ICT is used for knowledge presentation (representational use). Their investigation was done in a deep rural area in South Africa where tablets were deployed in schools. They conclude that several social factors need to be addressed for the successful integration of ICTs in schools. Some of these factors are relationship building, leadership, local buy-in, and ownership.

Unlike some developed countries, the adoption of Personal Health Records in South Africa is very poor. In their chapter, *Personal Health Records in the South African Healthcare Landscape: A SWOT Analysis*, Avuya Mxoli, Nicky Mostert-Phipps, Mariana Gerber identify contributory and inhibiting socio-technical factors of the adoption of such a system. They use Socio-Technical System (STS) theory as an interpretative framework.

Finally...

The few chapters included in this volume address barely touch on the magnitude of the possible topics in the field of ICT4D. The lessons learned from the research presented here will hopefully contribute to a better understanding of this complex beast. There is still a lot to learn. Perhaps it is too idealistic to hold onto the activist view that technology could be used an agent for change. This very sentence is loaded with ideologies, assumptions, biases and notions that require more intense debate. Nevertheless, it is only through debate, informed by research, that we could reach valuable conclusions.

Jacques Steyn

THEORY, MODELS AND METHOD

CHAPTER ONE

DIGITAL TECHNOLOGY FOR INCLUSION: A CRITICAL DISCOURSE ANALYSIS OF URBAN POOR GROUPS IN SOUTH AFRICA

MARIA ROSA LORINI, IZAK VAN ZYL
AND WALLACE CHIGONA

Introduction: the problem of exclusion

South Africa has one of the highest rates of inequality in the world (World Bank 2014). This is most observed in rural areas, townships, and informal settlements. Foremost development issues here include lacking and inaccessible public services (health, education and infrastructure, *inter alia*), high unemployment, violent crime, and recently, widespread xenophobia. With the advent of information and communication technology for development (ICT4D), digital technology has been earmarked to address global development priorities (or ‘mega-problems’ as per Heeks 2008) connected with income generation, access to services, and socio-economic equality (Duncombe 2007). This has concerned, at least idealistically, the improvement of conditions of underserved groups. Yet, an initial reading of the ICT4D literature indicates a worrisome trend of exclusion (Chigona et al. 2009). Often, beneficiaries of ICT4D initiatives are not formally involved in the development process, be it in conceptualization, implementation or ownership (Andrade and Urquhart 2010). This indicates a twofold problem of digital isolation for already under-resourced groups: (1) intended beneficiaries are primarily excluded from the generation of technological solutions (Winschiers-Theophilus 2012); and (2) they are further excluded from having sufficient access to digital technology (Lesame 2014). In South Africa, particularly in the Western Cape Province, digital exclusion is recognized as a significant obstacle in addressing issues of social, economic and cultural equality (Western Cape Government 2014). The main concerns here include the

level of access to ICT, the widespread lack of e-skills, and the effective use and adoption of technology for purposes of empowerment (ibid.).

In response to this context, this study describes the collective discourses around ICT that emerged through qualitative exploration, and in particular interviews, focus groups and participant observation. Moreover, it seeks to explore the uses, meanings and roles of ICT in cultivating empowerment, if and however possible, for underserved groups in the urban areas of Cape Town, South Africa. We frame this issue critically, and explore the perceptions that undergird the adoption and use of ICT in marginalized settings. Shifting the focus from the individual to the collective, we seek to understand how respective community groups converse about ICT to evaluate how such conversations affect its use and adoption. This is an initial point of departure for understanding how ICTs cultivate agency and capabilities at group level.

Our study is guided by the following research question: “What are the discourses associated with ICTs among collective groups in marginalized communities?” In addressing this question, this study represents an initial step to contribute to theoretical and empirical discussions of discourse in ICT4D (Bladergroen et al. 2012), collective capability (Ibrahim 2006), ICT-enabled empowerment (Avgerou 2010), and participatory and inclusive development (Fuchs 2010). In light of this, we will uncover the social appropriation of ICTs by communities to build toward more inclusive, contextual and socially responsive technologies and approaches.

Research problem and context

The research and practice of ICT for development has crystallized around creating the conditions under which the livelihoods of poor and marginalized people can be improved using digital technology (Unwin 2009). Historically, the dominant discourse in the field was that of the ‘digital divide’ (Wresch 1996), where a prevailing argument was that socio-economic exclusion could be resolved through technology access. In particular, the evolution of the field was marked by the many ‘hyper connected promises’ that ICT could offer. Such technology was ubiquitous, cheaper, more affordable, more efficient, easier to deploy and a means of instant communication (Unwin 2009). Within such a deterministic school of thought, researchers and implementers had similar idealistic assumptions about how users will respond and interact with technology (Van Dijk 2006). Not least in the South African context,

deterministic and ‘techno-centric’ assumptions negate the complexity of social and cultural dynamics, and have prompted both failure and unsustainable ‘techno enthusiasm’ (see Roode et al. 2004, Oyedemi 2009). Repeated failures of ICT4D projects motioned renewed efforts toward monitoring and evaluation, with the purpose to identify the critical factors underpinning failure (Heeks 2008). Several issues common to local and international ICT4D projects have been identified as critical to address, both theoretically and empirically: participatory processes in the identification of problems and development of research proposals; the mutual negotiation and framing of sustainability; the relevance of local and indigenous knowledge; the symbolic narratives that underpin technology adoption, and the cultural values and norms of the groups involved in the process, among others (see Sabiescu et al. 2014).

Ultimately, as ICT extends its reach through hyper connectivity and digitization, it enters new domains and territories of development. This is not to deny the threats of determinism, or of ‘techno-centrism’, as engendered in many ICT4D projects. In this regard, it becomes necessary to consider how digital technologies are perceived, negotiated, and utilized (Van Zyl 2013). Following these common issues, a critical analysis of discourses from community groups will allow for the emergence of unspoken and under-explored factors and dynamics to be addressed in employing ICTs for inclusive communities in South Africa.

A critical discourse analysis of social groups

Critical discourse analysis (CDA) is employed in this study as an analytic approach to give voice to the discourses that emerged from the field. CDA is a form of critical social research and views “discourse – language use in speech and writing – as a form of ‘social practice’” where “discourse is socially constitutive as well as socially conditioned” (Fairclough and Wodak 1997:258). Despite the different schools of CDA, researchers share the perspective that discursive practices contribute to the creation of the social world (Pennycook 2001). In this regard, CDA offers not only an explanation of words and their contexts, but also examines the implications thereof and, possibly, seeks to change reality (Myers and Avison 2002:15, Gee 2014:9).

CDA has its roots in critical social theory, which addresses ethical and moral questions by seeking emancipation for all the involved groups (Wodak and Meyer 2009): researchers (with their assumptions),