Development Informatics Research and the Challenges in Representing the Voice of Developing Country Researchers: A South African View

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Abstract
Indigenous or local researchers from developing countries have not made a leading contribution to development informatics (DI) or information and communication technologies for development (ICT4D) research. This is noteworthy since these researchers should be in a prominent position to contribute to the discourse, where context knowledge is regarded as vital. Furthermore, a dependence on foreign scholarly direction can create a gap between research and reality in a way that affects the success of ICT programmes in African countries. Extant literature highlights this problem, but most studies stop short of considering the causes and proposing how to amplify the voice of developing country researchers. This paper documents the ICT4D/DI research discourse that took place during four seminal academic events in South Africa during the period 2012 to 2015. Those discussions are presented and analysed here to contribute to the wider discourse on ICT research and practice in developing countries, with the aim of enhancing the research contribution of developing countries. An interpretivist, involved researcher analysis of the workshop reports is conducted to gain an improved understanding of the South African ICT4D/DI researcher's challenges to proportional participation. While this study takes a South African perspective, many of the findings could apply to researchers in other developing countries.

Keywords
development informatics, ICT4D, research participation, challenges

Recommended citation
Van Biljon, J. (2016). Development informatics research and the challenges in representing the voice of developing country researchers: A South African view. *The African Journal of Information and Communication (AJIC), 18,* 75-94.

1. Introduction

Information and communication technologies for development (ICT4D) "is the name given to a range of activity which considers how electronic technologies can be used towards socio-economic development of developing communities worldwide" (Donner & Toyama, 2009, p. 1). The technology needs to be designed to operate in a complex social, political, economic, and cultural context and therefore it is necessary to consider the multi-perspective approach of the ICT4D domain (Thapa & Sæbø, 2014). Wilson (2002) maintains that the commonly assumed model of ICTs and development is grounded in assumptions of technological determinism, which allow the complex political factors influencing poverty and inequality at local, national and international levels to go largely unquestioned. This model is based on the construction of what counts as legitimate or valuable information and knowledge, the developmental aims of the programmes and the particular models of progress focused on catching-up to industrial country ideals.

Sen's theory of human capability criticised the emphasis on the economic criteria of advancement as the primary or sole means of measuring human wellbeing and proposed the capabilities approach towards increasing human opportunities, capabilities and freedoms (Sen, 1999). Sen's capabilities theory has been criticised for obscuring or neglecting three key realities, namely the constitutive nature of human interdependency, the problematic nature of the public realm, and the exploitative nature of capitalism (Dean, 2009). However, the prominence of Sen's theory in development informatics (DI), as operationalised by Kleine (2010), is an influence to be recognised in evaluating developmental outcomes (Hatakka & Lagsten, 2012).

Against the ongoing debate of what development is, this article focuses on the definition of developing, emerging and developed countries as characterised by Roztocki and Weistroffer (2011). South Africa, a country with one of the highest Gini coefficients in the world in terms of both income and wealth, i.e. the greatest dispersion between the rich and the poor in terms of income and wealth distribution (Bosch, Rossouw, Claassens, & Du Plessis, 2010), exhibits characteristics of both developing and emerging economies. Given the difficulties in distinguishing between developing and emerging economies, the term *developing country* will be used to include both developing and emerging economies for the purpose of this article.

Given the broad scope of DI, which spans a number of diverse disciplines, and the multi-, inter- and trans-disciplinary nature of the field, it is inevitable that there would be divides and tensions in the quest to understand how technology interacts with global development (Burrell & Toyama, 2009). Therefore research into the use of information and communication technologies (ICT) for development inhabits a contested space, characterised by varying philosophies, aspirations, realities and priorities (Van Biljon & Alexander, 2015). One of those divides relates to the use of the terminology relating to ICT and development, where the term ICT4D has been

associated with a techno-centric approach and DI with a socio-centric approach (Heeks, 2007; Zheng & Heeks, 2008). In terms of presenting a South African view, it is necessary to consider both the DI and ICT4D communities in South Africa and therefore the terms *development informatics* (DI), *ICT-for-development* (ICT4D) and *ICTD* (*ICT-and-development*) are used interchangeably in this paper, except when explicitly distinguishing between the terms.

Community informatics (CI) is a research domain related to DI (Stillman & Linger, 2009). According to Gurstein (2004), CI is the application of ICT to enable and empower community processes. Stillman and Linger (2009) maintain that CI has a dual focus: first, the conduct of research about the relationship between the design of ICTs and local communities, and second, the implementation of ICT projects in local communities. The purpose of this article is to investigate the research publication challenges researchers in DI experience. This population of researchers includes ICT4D and CI researchers, as researchers often work at multi-, inter- and trans-disciplinary levels. A fairly substantial body of work has been generated to conceptualise the DI landscape and to set research priorities and approaches in the field. Examples of these endeavours are summarised and presented in Table 1, towards highlighting the trends in country participation.

Table 1: Comparing studies on trends in country participation

Citation	Period	Scope	Trends and challenges identified since 2006
Walsham & Sahay, 2006	2000-2004	Review of papers from 13 journals and two conference proceedings on information systems in developing countries.	A lack of article contributions originating from the indigenous or local researchers in developing countries.
Gitau, Plantinga & Diga, 2010)	1990-2009	A quantitative survey of Thomson Reuters Web of Science database to identify academic conferences and journal publications authored or co-authored by African scholars.	The African contribution to international ICTD research and scholarship was estimated to be in the region of 1% to 9%.
Gomez, 2013	2000-2010	Content analysis of 948 papers using two conference series and five journals.	Comparing research focus between countries, most papers focused on India.
Williams, Lenstra, Ahmed & Liu, 2013	No date range	Analysed the first author affiliations by region of 563 CI empirical studies.	Most papers were contributed by authors from North America, followed by Asia, Europe, Africa, Oceania and Latin America. The prominent countries were the US (40%) and UK (10%), followed by India (10%), Australia (5%), Canada (4%) and South Africa (3%).

Thapa & Sæbø, 2014	No date range	Analysed 80 ICT4D papers, selected with a Web of Science keyword search, limited to highly cited papers and authors.	They concluded that research in the ICT4D area was mainly conducted in sub-Saharan African countries, India, and Latin America. The contributions of authors from developing countries were not specified, but of the 10 papers identified for further analysis, only four had a developing country researcher as the first author.
Naudé, 2015	2000-2013	Analysed 378 articles published in the *Electronic Journal of Information Systems in Developing Countries (EJISDC)*	Of the seven world regions, Africa had the strongest author presence with 179 authors (21.88%), followed by Asia with 173 authors (21.15%), North America with 159 authors (19.44%), Europe with 157 authors (19.19%), Oceania with 92 authors (11.25%), Latin America and the Caribbean with 39 authors (4.77%), and the Middle East with the lowest author contribution at 19 authors (2.32%).
Ghosh, Mudavanhu & Belle, 2015	2011-2014	Analysed papers published by the International Development Informatics Association (IDIA)*	South Africa was identified as the country with the highest number of researchers presenting at IDIA conferences. Sadly, papers from other African countries were largely missing. In 2014, for example, only one paper was from another African country, Namibia. In 2013, there were no papers from other African countries.
* Notably the IDIA was established specifically to provide a platform for information exchange between global South-based ICT4D researchers with the hope of providing a more critical and context-aware strand of ICT4D research (Ghosh, Mudavanhu, & Belle, 2015). The aim is made explicit as being to escape the dominant viewpoints and biases that may be present in the ICT4D research initiated by researchers in developed countries.			

The findings from the studies presented in Table 1 support the notion that researchers from developing countries are under-represented in terms of publication output. The exception is the output generated by the conferences of the IDIA, which was initiated with the aim of presenting research from developing countries and mostly features South African authors (Ghosh, Mudavanhu & Belle, 2015). Naudé's (2015) findings seem to indicate an increase in the research contribution from developing and emerging countries, especially from Africa. However, it has to be noted that Naudé's findings were based on only one journal. Furthermore, North America and Europe combined still contributed 40% of the total publications in the *EJISDC* journal analysed. Bidwell (2016) contends that the visibility of African human-computer interaction research and practice, in Africa and internationally, is challenged, because the practices of technology production, education and research tend to reproduce meanings that associate the continent with absence. The methodologies employed in the papers mentioned in Table 1 consisted mostly of a rigorous literature review of the conference and/or journal publications that have a high proportion of ICT4D relevant papers. Though helpful in quantifying the phenomenon, the studies mentioned (except for Gitau et al., 2010) do not provide insight into the reasons for the less than proportional contribution made to DI research by developing country researchers. This study takes a qualitative approach, by analysing workshop outcomes from four South African workshops focused on connecting DI researchers and promoting DI research. The aim is to provide some insight into the challenges South African researchers face in the dissemination of their research.

2. Conceptual divides in the ICT4D literature

Donner and Toyama (2009) identified the *digital divide* as the most powerful popular concept in the ICT4D area. The *digital divide consensus* has long become an inadequate guide for researchers and policymakers alike (Galperin, 2010) and it has since been associated with the first wave of ICT for development, namely modernisation and transfer (Heeks, 2014). However the DI field is still characterised by divides and therefore the known divides are proposed as a way of structuring the challenges that could impact researchers' participation in publishing and disseminating DI research. The *technical-social*, *research-action* and *developed-developing* divides in community informatics research as identified by De Cindio (2015) are discussed here as a literary frame of reference for a thematic analysis of the ICT4D workshop reports presented in this study.

1. The *technical-social* divide relates to the difference between researchers with a concern for artefact-type problems and design, and those researchers more concerned with social and social-technical problem-solving (Walsham, 2013). Zheng and Heeks (2008) identify a hard-soft tension, i.e., deterministic, standardised approaches versus softer approaches that investigate institutional and social complexity and informal and contingent circumstances, including cultural differences.
2. The *research-action* divide contrasts the focus on academic value (publications, citations and other academic requirements) with the potential benefits that effective implementation could bring to a community (De Cindio, 2015). From a community informatics perspective, the lack of a tight connection between research and action is a source of problems impacting both the practical relevance (projects not having been implemented and tested) and the theoretical contribution (field projects undertaken without a scientifically rigorous background), which applies to DI as well. Heeks (2007; 2014) and Walsham (2013) note a tendency to prioritise action over knowledge, with few authors contributing to theory building. Steyn (2015) argues for ICT4D research going beyond the comparison of technicalities and artefacts, to address the foundational assumptions and concepts in the field.
3. The *developed-developing* divide provides challenges on many levels. At a philosophical level, the divide goes to the very definition of what *development* is (Merritt, 2012; Wilson, 2002). The fact that much of the research (including the technology used) is planned and funded from developed countries, specifically the global North, while the implementation and evaluation are done in developing countries, can influence the perceptions of what topics are relevant, which may then impact on publication opportunities and success (Gitau et al., 2010). Another example is the publication of future DI research priorities by researchers from developed countries, as in the *Future Priorities for Development Informatics Research from the Post-2015 Development Agenda* by Heeks (2014). Due to global crises, the differences are somehow shrinking, enhancing the possibility to learn, each from the other side (De Cindio, 2015). Furthermore, the current crisis in

funding and political support to the development sector accentuates the urgency of improving internal collaboration and information sharing processes (Müller, 2014).

The *technical-social, research-action* and *developed-developing* divides have implications for ICT4D research in terms of prioritising items on the international research agenda, which influence funding and publication opportunities, for example priorities as disseminated through influential publications such as the *Digital Dividends* report (World Bank, 2016).

3. Methodology

As is evident from the introductory problem-setting, there is less than proportional participation from indigenous or local researchers from developing countries in the publication of DI research. This motivated the meta-research question for this study namely:

- What is the state of development informatics in South Africa in terms of challenges to research participation?

Given the aim of understanding the situation and access to the primary "data" captured at ICT4D workshops in South Africa, the broad investigative goal was translated into the following research question:

- What challenges to South African DI research have been identified in the so-called "ICT4D workshops" conducted from 2012 to 2015?

The reporting on the workshops is done from the perspective of a researcher (the author) in the Gauteng province, who was tasked to establish a new ICT4D research group, without having been connected to any existing group and who was interested in understanding the South African ICT4D landscape. The approach has limitations, but it is considered a useful point of departure in presenting the challenges experienced by researchers in the South African DI landscape since 2012. Given the aim of understanding the research challenges, an interpretive methodology was considered appropriate. The author was a participant in all the workshops and involved in organising some of them. Geertz's (1973, p. 9) interpretive view is particularly appropriate to describing the data collected from the workshops, as he states: "What we call our data are really our own constructions of other people's constructions of what they and their compatriots are up to".

The researcher's stance resonates with the interpretive stance of the involved researcher actively trying to improve the situation (Walsham, 2006). A thematic analysis was considered, but given the differences in the formats of the data, that was problematic. Instead the workshop report review was organised around specific themes (see Table 2) and interrogated for providing insights into the three research gaps (the *technical-social*, *research-action* and *developed-developing*) as discussed in the

literature review.

Reports from the following events in 2012, 2013, 2014 and 2015 were considered for analysis:

- In 2012, the first workshop of the ICT4D workshop series was hosted at the University of South Africa (UNISA). The programme consisted of invited presentations, followed by a panel discussion on ICT4D research agendas. The speakers were prominent ICT4D champions from the International Development Informatics Association (IDIA) (based in South Africa), the Council for Scientific and Industrial Research (CSIR) and UNISA.
- In 2013, a workshop was conducted at the CSIR (Pretoria) with speakers from IDIA (South African and Australian) and doctoral students who presented their work. No data were captured in terms of outcomes or objectives so this event was excluded from the analysis.
- In 2014, there was a concerted effort to unite the researchers from the northern part of South Africa with those of the southern parts, and two widely advertised workshops were conducted. The first was at the 2014 conference of the South African Institute of Computer Scientists and Information Technologists (SAICSIT 2014) in Pretoria and the second was at the 2014 International Development Informatics Association Conference (IDIA 2014) in Port Elizabeth. At SAICSIT 2014, the groups represented at the meeting were given the opportunity to present their research focus areas. This was followed by a discussion on collaboration initiatives. At IDIA 2014, the findings from the SAICSIT 2014 workshop were discussed together with an invitation for new research groups or initiatives to be added. Research groups who had not presented their research foci at SAICSIT 2014 were requested to do so, but only one group, namely Monash University, was added. It is important to note that the two workshops were held at different geographic locations (one in the north, one in the south) in South Africa, and this provided the opportunity for researchers and practitioners from both northern and southern research localities to be involved.
- In 2015, it was agreed that the SAICSIT events would be organised alternately by the groups in the south and the north of the country, hence the 2015 event at SAICSIT was hosted by the University of Cape Town in Stellenbosch. The format was to have two invited speakers, followed by a group discussion on challenges and initiatives towards promoting ICT4D research in South Africa and Africa.
- The events in 2012, 2014 and 2015 were selected for analysis and evaluation, based on their relevance to shaping the ICT4D landscape in South Africa and the availability of the workshop reports, but it is noted that there were other ICT4D events during this time. The workshop reports analysed in this article were selected because they are in the public domain and were made available to the attendees for scrutiny and feedback. However, interpreting events towards

extracting insights is open to subjectivity and therefore it has to be recognised as an involved researcher's abstraction of the reports provided. Furthermore, the information about research agendas and thematic areas has to be viewed in terms of the date of the event, as research agendas may change over time. Grounded theory, described by Urquhart, Lehmann and Myers (2009) as a qualitative research method that seeks to develop theory grounded in data systematically gathered and analysed, may be an appropriate methodology for theorising the research participation of developing country researchers in an extended future study.

4. Overview of the results

The workshops are tabulated in Table 2 to allow some overview and comparison between the events on selected attributes. This is followed by a more detailed discussion of each workshop. The ICT4D workshop reports were sent out to the attendees for review and comments and updated according to the feedback provided. The workshop reports summarising the outcomes are available from Van Biljon (2016).

Table 2: Comparative summary of the ICT4D workshops

	2012 UNISA	2014 SAICSIT	2014 IDIA	2015 SAICSIT
Attendance	Attended by 66 people but many of those were not involved in ICT4D research.	Attended by 36 people, all of whom were involved with ICT4D as researchers.	Attended by 24 people, all of whom were involved with ICT4D as researchers, practitioners or both.	Attended by 32 people all of whom were involved with ICT4D as researchers, practitioners or both.
Minimum number of South African institutions involved	4	9	11	14
Audience participation	Questions to panel.	Attendees were grouped according to their research institutions and each group presented the focus of its group.	The audience responded to a summary of the activities at SAICSIT 2014.	Attendees selected their groups based on the most relevant ICT4D challenge. Each group presented its response to the challenge.

Outcome	Consensus on research agenda. General focus on readiness and availability.	Consensus on collaboration initiatives. Developments and differentiation made it difficult to identify a common research agenda. The focus was on identifying research areas for collaboration. General focus on uptake and impact.	Consensus on collaboration initiatives. The ideas of more special issues on ICT4D, and an open, South African knowledge repository, were discussed.	Goals related to: structure and dissemination; research priority areas; engagement and collaboration; curriculum and teaching.
Challenges	Connecting research groups. Identifying champions. The need for sustainable long-term networks of participants. The need to make a better world with ICT4D.	Publication opportunities. Collaboration opportunities. Institutional factors.	Publication opportunities. Knowledge sharing via lists. Political and language bias.	Publication opportunities. Knowledge sharing via lists or websites. Funding. Difference between information systems and computer science research interests.

2012 UNISA (organised by UNISA)

The event held on 8 February 2012 at UNISA was titled "Towards a Research Agenda in ICT4D", with participation from the CSIR, Monash University, the University of Cape Town, and the University of Pretoria.

The strategic development focus as advocated by Thompson and Walsham (2010) was emphasised by a group of panellists and the discourse could be placed in the fourth wave of DI research development, namely design and impact (Heeks, 2014). In summary, the following perceived needs within the South African ICT4D research community were listed: the need for "bridges", the need for "champions", the need for long-term engagement, the need for sustainable long-term networks of participants, and the need to make a real difference.

The following research directions were identified towards establishing an ICT4D agenda: monitoring and evaluation of projects in the ICT4D field; theories, models and practical examples; moving from understanding the artefact to understanding ICT enabled work practices in meeting development; scalability, sustainability, impact assessment and learning from IS failures; and socio-technical perspectives on ICT4D. The gurus (ICT4D champions) listed were Chrisanthi Avgerou, Richards Heeks, Mikko Korpela, Ojelanki Ngwenyama, Sundeep Sahay, Kentaro Toyama, John Traxler, Tim Unwin and Geoff Walsham.

2014 SAICSIT (organised by the University of Pretoria, UNISA and the University of Cape Town)

Each participating research institution was presented with the opportunity to explain its focus and the thematic areas of involvement and requested to include a diagram of the presentation. Figure 1 provides an overview of the main institutions represented and the thematic areas covered, including the CSIR Meraka Institute, Nelson Mandela Metropolitan University (NMMU), Rhodes University, University of Cape Town (UCT), UNISA, the University of Pretoria (UP), the University of the Western Cape (UWC) and the University of the Witwatersrand (Wits). One user experience researcher from the Western Cape Province government was present, but since no other government departments or practitioners were present this is not included in Figure 1. The data are based on the input of the attendees, which may present an incomplete picture of the activities at these institutions. However, it remains useful in getting an overview of the fields covered.

Figure 1: Main institutions represented and the thematic areas (based on SAICSIT 2014 event)

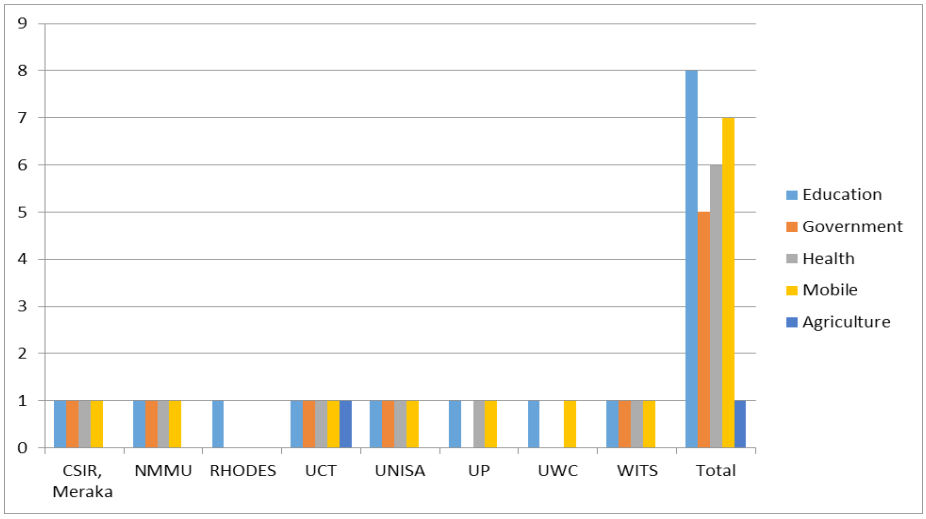

Table 3 presents the research fields in which the researchers were located, together with cross-cutting thematic areas. The participants were requested to select one of two fields, information systems or computer science, which obscures the fact that they may also have been working in other fields. Despite the limitation on the scope of the data (only one workshop), the depiction is considered useful as a starting point in plotting the DI landscape, particularly as the participant responses were aggregated to the institutional level, revealing some detail of the institutional research focus.

Table 3: Research focus of South African institutions involved in ICT4D (based on SAICSIT 2014 event)

Affiliation	Field *	Additional fields (if mentioned)
CSIR Meraka	IS, CS	Monitoring and evaluation
NMMU	IS, CS	Not stated
Rhodes	IS, CS	Critical theory
UCT	CS, IS	Heritage, computations, linguistics, computational, neuro-science
UNISA	CS, IS	Knowledge management, culture, humanities, entrepreneur-ship, creative industries
UP	IS	Creativity, monitoring and evaluation
UWC	CS	Not stated
Wits	IS	Smart cities
* IS = information aystems; CS = computer science		

2014 IDIA (organised by UNISA, UP and UCT)

The organisers presented feedback on the SAICSIT 2014 event earlier that year (see details in Figure 1 and Table 2), and collaboration initiatives were discussed. The initiatives included proposing a special issue with an African focus in a high impact ICT4D journal, a Google Group ICT4D-4ALL to be used for distributing further communication, and development of a knowledge repository on South African ICT4D research.

2015 SAICSIT (organised by UCT)

The topics identified for the group discussions included structure and dissemination, research priority areas, engagement and collaboration, and curriculum and teaching. The ideas for promoting ICT4D research in South Africa and the collaboration initiatives identified by each group were presented and recorded. The initiatives were recorded, with the idea that the individuals assigned under the various topics would work towards the goals listed, especially those related to community building and the hosting of events in future years.

In summary, the format and purpose of each of the four workshops was different, as the understanding of the field and the cohesion among the researchers evolved. Some of the challenges noted pertained to the connection between researchers individually and also between groups; the need to identify champions; the need to do meaningful research towards making a better world with ICT; publication, collaboration and funding opportunities; and, finally, the perceived paradigmatic divide between the technical and socio-technical aspects. Although the discussions were not focused on research contributions alone, all the challenges mentioned could influence the research participation and impact on South African DI researchers. A limitation is that the respondents were mostly from universities, so other stakeholders were not

equally represented. In mitigation, the researchers at universities are an important grouping when considering publication challenges.

5. Discussion

The challenges identified during the workshops are now structured according to the three divides (De Cindio, 2015) discussed in the literature review.

Technical-social divide

The interdisciplinary nature of the field, and more specifically the socio-technical gap (Zheng & Heeks, 2008) identified in literature, were confirmed as contributing to the challenge of collaborating. Notably, researchers from the socio-technical research stream (mostly researchers with a background in information systems) prefer the term DI, while researchers from computer science favour the term ICT4D. The request was made for dedicated streams on artefact design and development, in conferences like the IDIA conference. However, an analysis of IDIA publications in terms of research areas (Ghosh et al., 2015) has shown that 43% of the papers published in the period 2011 to 2014 were in fact on artefact design and implementation. This highlights the need for more awareness and knowledge of research and dissemination opportunities in the research community.

When considering the past and future of DI research in terms of the four development waves, Heeks (2014) mentions the evolution from a techno-centric agenda to a more socio-centric agenda. Accordingly, it is necessary to consider that the terms technical and social may be complementary rather than opposing. While the computer science stream may be more focused on the artefact and design science perspective, this does not exclude investigation of the socio-cultural aspects using multi-, inter- or trans-disciplinary approaches.

The role of terminology in complicating ICT4D research and dissemination should not be under-estimated. Merrit (2012) notes the disagreement about the term ICT4D, specifically the "4D" (or "for development"), where both "for" and "development" are troublesome words for reflective practitioners and researchers, potentially presenting both opportunities and challenges in the field. The term *digital development*, rather than DI or ICT4D, was used in the 2016 World Development Report titled *Digital Dividends* (World Bank, 2016). Heeks (2016) makes an interesting comparison, linking the term digital development to "Development 2.0" models and the term ICT4D to "Development 1.0" models, and argues that digital development could possibly be termed *ICT4D 3.0.* The latter approach provides a way of capturing the evolution without "losing" the value inherent in the ICT4D brand, as also recognised in the Heeks (2015) narrative and understood by non-academic stakeholders. An in-depth discussion of the terms is beyond the scope of this article, but while acknowledging that specialisation and refinement of terms are part of the academic discourse, it is also necessary to consider the adverse effects of continual rebranding

in a context with diverse stakeholders, including researchers, practitioners, funding agencies, NGOs, governments and industry.

In the interests of global development and for the progress of the field, it is imperative that research efforts are complementary and cumulative, rather than siloed or oppositional (Donner & Toyama, 2009). Shared terminology is one of the fundamental constructs enabling interdisciplinary dialogue and therefore the overall cost-benefit of continually changing terminology should be considered. This should not be confused with the intention to eliminate alternative assumptions or theoretical perspectives, as warned against by Avgerou (2010), as this pertains only to the notion that introducing new terms should be done mindful of the branding aspect, i.e., the inherent value of a generally known and accepted term in connecting diverse stakeholders. Based on the literature and the discussions in the workshops, it can be concluded that the technical and social are both essential aspects of the DI discourse. Albeit driven by researchers with different backgrounds and skills, the focus should be on promoting an understanding of the common interests, while recognising the value of disciplinary, subject-specific research in both the technical and the social aspects of DI. An implementation example is to have conferences with a keynote or other plenary sessions that explicitly reach out to non-subject specialists (Walsham, 2013).

Research-action divide

The need to make a positive and meaningful difference, as called for at the 2012 UNISA Workshop, relates to the research-action divide (De Cindio, 2015) mentioned earlier and to the tension between the desirability of interdisciplinary work and the realities of current social structures of academic prestige and reward (Walsham, 2013). It resonates with the unifying vision of "making a better world with ICTs" (Walsham, 2012) and implies the need for outsider-researchers involved in ICT4D research and practice in Africa to honestly question their own values, attitudes, motives and understanding of the development reality (Krauss & Turpin, 2013). This resonates with the advocacy of Gitau et al. (2010) and Bidwell (2016) for a local interpretation and publication of African narratives. Gitau et al. (2010) identified publishing culture, institutional factors, information access, political and language bias and, finally, lack of conference attendance, as issues that influence ICT4D research dissemination by Africans. The findings from the workshop analysis confirm that all of these remain relevant barriers, with lack of funding impacting institutional factors, conference attendance and information access.

Vivier, Wentzel and Sanchez (2015) argue that an effective communication interface between government and citizens can strengthen government responsiveness and deepen citizen engagement. While such communication and information exchange takes many formats, given the various platforms and technologies available, the development of an ICT4D knowledge repository, as called for at the IDIA 2014

conference, could prove useful in connecting stakeholders across the divides.

Developed-developing divide

Global academic literature remains dominated by northern hemisphere research and developed world models that do not always take into account the specific socio-political environments of the developing regions (Alperin, 2015; Neylon, Willmers & King, 2013) and the challenges faced by researchers from developing and emerging economies. Citation metrics, like any other socially constructed information and knowledge artefact, can reflect unequal distributions of power and privilege and therefore the factors influencing bibliometric and altimetric data should be analysed when considering the research perspective on meaningful and equal partnerships with community, civil society and NGOs (Van Biljon, Naudé, & Lotriet, 2016). As cautioned by Gitau et al. (2010), a gap between researcher and reality can affect the success of ICT programmes in African countries, but also reflects a more serious dependence by Africa on foreign scholarly direction. From observation of Figure 1, it can be seen that *education* was the best represented research area for the group of SAICSIT 2014 workshop attendees, while education is not rated a top priority in terms of internationally under-researched DI areas (Heeks, 2014). Ghosh et al. (2015) highlight the same finding in the IDIA (2011-2014) analysis and explain that, in terms of the challenges South Africa faces in developing human capacity under conditions of severe resource and skill constraints, this is an example of local researchers addressing local challenges, even though that topic is not prioritised on the international publication agenda.

During the 2012 workshop, the need for local ICT4D champions was identified. The gurus identified were not from South Africa, Africa or even developing countries. Renken and Heeks (2014) describe an ICT4D champion as a person with a strategic vision towards ensuring *results*, who engages with stakeholders towards promoting *ideas*, rallying support and finding consensus in building *relationships* and who actively identifies and mobilises the *resources* required to advance the project. They distinguish between the attributes of *importance* and *influence* when considering ICT4D champions. While local ICT4D champions are well situated to understand the importance of research problems and needs, the influence of international ICT4D champions resident outside the developing world has to be recognised as a force that could shape research agendas and the dissemination of research outputs constructively.

Developed country researchers may have a more nuanced understanding of the formal academic publication and dissemination context, since most of the high impact journals are managed from developed countries and often by editors from developed countries. Considering the top 10 empirical case studies on rural and remote communities selected for analysis in a literature review on the link between ICT and development in the context of developing countries (Thapa & Sæbø, 2014), it is interesting to note

that only four of those involve collaborations between a developing and developed country researcher. Bidwell (2016) warns against collaborations where the African counterparts are limited to collecting data because publishing time constraints do not allow for the development of more equitable partnerships. Based on the literature and the findings from the workshops presented, it is concluded that international collaboration should be recommended, on condition that the collaboration involves the ongoing exchange of ideas, bilateral knowledge transfer, and equitable sharing in the research knowledge commodification.

Alternative thinking about DI research

Interdisciplinary research fields present challenges to professional librarians and scholars who aim to characterise and delineate subject areas (Less, 2008). A study on country trends and scholarly collaboration in the ICT4D research community (Naudé, 2015) identified disciplinary differences and research domains (e.g. , ICT4D) as factors that may limit visibility, exposure, readership and citations. Altmetrics (alternative citation metrics) measure scholarly performance of individual articles, based on engagement of scholars and the public with research articles in online and social media environments (Lin & Fenner, 2013). Altmetric measures are steadily gaining ground in the global political environment, where research institutions are under increasing pressure to provide evidence of not only scholarly, but also societal impact of the research (Bornmann, 2014; Neylon et al., 2013). The increased use of altmetrics should be considered towards overcoming some of the institutional and financial barriers to disseminating and promoting research output.

In a study on South African ICT4D websites, dedicated ICT4D or DI websites could be found for only five of the 23 public universities (Van Biljon, Pottas, Lehong, & Platz, 2016), while nine of those were involved in the SAICSIT 2014 workshop. The lack of online presence is undoubtedly a barrier to discoverability and participation. Finding research output and dissemination opportunities, with regard to publication, funding and collaboration, were rated more challenging by researchers from some South African institutions than others. Therefore it seems that the dissemination of information about publication, funding and collaboration opportunities could play a role in improving the situation.

The establishment of ICT4D/DI events, where representatives of the universities and research organisations meet annually at two main South African research conferences, is a positive development towards community building. Practitioner and government involvement is less evident, but some practitioners and government representatives attended the 2014 and 2015 events and thus initiatives to improve communication and research awareness between the sectors is recommended. The latter is important in managing the research-action divide and improving impact beyond academic publications. The IDIA conference has become an important venue for connecting South African researchers and amplifying their voice, but involving

researchers from other African countries is clearly a priority.

6. Conclusion

A number of studies on country participation and regional trends, published in the past decade, support the fact that indigenous or local researchers in developing countries, including South Africa, have not contributed proportionally to DI research publication output. This article documents the ICT4D/DI discourse that took place during four academic events in South Africa over the period 2012 to 2015. The workshop documentation and analysis is presented as a point of departure in reflecting on the South African DI discourse and how the discussions at those events, including the challenges mentioned and outcomes proposed, can be used to inform future developments and strategic decisions.

The challenges identified in contributing to the research literature relate, inter alia, to the research-action divide, and time and resource constraints, which are not unique to the discipline. Other challenges, like the conceptual gaps identified, may be inherent to the interdisciplinary nature of the field, thereby limiting the publication opportunities to a specific stream within the interdisciplinary field. Disciplinary, institutional and financial barriers to disseminating and accessing publications impact bibliometric measures of ICT4D research, but altmetrics show potential for overcoming some of the institutional and financial barriers. The actionable challenges relate to a consideration of the impact of continual rebranding of the field in terms of the terminology used, information and dissemination opportunities, and the underplayed role of local research champions.

Dissimilar levels of access to available publication, collaboration and funding opportunities can be mitigated by online knowledge sharing and thus the proposed initiative of developing an open knowledge repository should be investigated. The establishment of dedicated ICT4D/DI events is a positive development towards community building, but more efforts are needed to facilitate practitioner involvement. The promotion of local ICT4D champions and sustainable, long-term research collaboration between developed and developing country researchers have also been mentioned as initiatives to amplify the voice of South African DI researchers. Future research is needed to monitor and evaluate the impact of the current initiatives towards improving the publication contribution of indigenous or local South African DI researchers and to extend the study to include other African countries.

Acknowledgments

The author acknowledges the National Research Foundation of South Africa for financial support in conducting this research.

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