

Beyond being a Proxy User: A look at NGOs’ Potential Role in ICT4D Deployment

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Abstract— Non-governmental organizations (NGOs), especially those based at the community level, have been identified as pivotal tools in the field of social economic development. They are known to have structured frameworks through which they dispense their programs to achieve desired results. However, ICT4D practitioners (researchers and technologist) have relegated this resource to primary means of getting into the community for logistical purposes which might explain the high levels of failed and mismatched technological interventions. This paper argues that the relationship between NGOs and technologists can be extended further than the current view of a researcher’s dependence on an NGO as a ‘local champion’. Action Research is rapidly being adopted in ICT4D and is seen as a satisfactory means of enriching the research experience, which leads to tangible, sustainable results. Using the five stages of an Action Research project cycle as a framework, we demonstrate how NGOs and the community can take a pro-active and leading role in research and design of sustainable ICT4D interventions.

Index Terms— ICT4D, NGOs, Action Research, Participatory Design

I. INTRODUCTION

The field of ICT4D research is littered with unsuccessful, or partially successful, technological interventions which had the intention of improving the quality of life for citizens, or impact socio-economic development. Indeed, Heeks [21] claims that 70% of all ICT4D projects fail within the first couple of years. Common amongst factors contributing to failure are the cultural and geographical distances of researchers from the problem they intend to target. Limited time frames of research projects and technologists’ overarching agendas compromise engagement and insight into local socio-economic contexts. Researchers are usually based elsewhere and field projects are often training grounds, to pursue academic degrees, pilot studies or test-beds for

applications without any intention to progress the products into that community. This means that researchers rarely plan sustainability into projects and their goals emphasize novelty or ‘proof of concept’. The situation leads to accusations of ‘development tourism’ [8] or exotic romanticism [5] and an approach to “design from nowhere” [45]. Thus, it is little surprise that marginalized communities ‘misuse’ or lack interest in interventions [21]. ICT4D increasingly recognizes the value of ‘local champions’ [16] to the sustainability of interventions and, simultaneously, the allied field of Human-Computer-Interaction (HCI) for Development recognizes the role of ‘human access points’ [30] and non-governmental organizations (NGOs) [33] in bridging the distances between researchers and target communities. Here we take a step towards a possible approach to centre design processes on facilitating organizations in order to more successfully uplift communities, and nations, socially and economically as well as design usable and useful technologies.

We propose that processes to support co-operation between researchers and NGOs, within design processes, is imperative to ICT4D projects and must go beyond drawing on information collected, or community links established by NGOs. Making use of an NGO’s knowledge or contacts in designing solutions can indeed reduce research time, assuming that the NGO has a valid and comprehensive understanding, but may exploit NGOs as ‘entry points’ into communities; as suggested by a phrase heard on the ground: “NGO Crawling”. Previously, we have described ways to achieve a ‘fair partnership’ by supporting the NGO’s aims and involving NGOs in monitoring, evaluating and checking usefulness and sustainability in the community [16]. Here, we further pursue the potential of a mutually beneficial relationship between NGOs and researchers in design practices. We develop a framework, in a Sub-Saharan Africa context, that aims to improve the benefits of technology use to communities locally and via their influence on political processes. This framework draws on our experience in collaborating with NGOs in Africa on technology interventions and perspectives from ICT4D policy and contemporary theory in HCI. The framework is embedded in an Action Research methodology, which emphasizes the role of learning and co-creation relationships in design while, also, providing us a common platform to express our

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individual research orientations.

II. NGOS

According to the UN, a non-governmental organization (NGO) is a not-for-profit, voluntary citizens group, which is organized on a local, national or international level to address issues in support of the public good [47]. In developing regions NGOs play an important role, particularly within isolated communities, to deliver welfare services where nation states are unable to do so.

NGOs may be used by governments and multi-national organizations to facilitate and adapt services, ranging from civic education to health. NGOs often apply participatory approaches to development which enable them to deploy new strategies flexibly and at small scales and mobilize resources or organize people who attempt to solve their own problems [18,28]. Many take a bottom-up approach by facilitating social services to communities while, simultaneously, “uplifting people particularly those who are most poor and needy, identifying their needs, and building local ownership for initiatives” [36]. According to Nzimakwe [ibid], NGOs can be flexible, innovative and creative in responding to a community’s aspirations and problems within their unique social context. They can act as intermediaries between citizen and government [27] and impact on public policy on behalf of citizens. When marginalized citizens “lack representation in the political process”, some rely on their local NGOs to carry out their requests to government [22]. Finally, many NGOs can mobilize grassroots members, to act in solidarity (by rallies or petitions) and amplify this voice by lobbying upon their societal interests (e.g. for affordable housing, water service provision, improved public sanitation) and for better living conditions [48].

NGOs are, of course, not without their critics. NGOs tend to be donation-based and inconsistent funding can constrain resources and make planning difficult. NGOs may also lack “the capacity to involve the ‘ultra poor’” and appear undemocratic with limited impact [22]. NGOs can also have political complexities within their relationships between local communities and possibly unscrupulous intentions with the state or private sector. Despite their alleged autonomy from the state, a NGO’s efficacy still requires government support, as Heinrich [22] critiques:

“as long as the state does not show its responsiveness towards the needs of the poor voiced through NGOs, and as long as it further curtails the leeway of NGOs in implementing pro-poor policies, the NGOs’ performance of their advocacy function in this regard will remain mediocre”.

Additionally, an NGO’s efficacy can create community dependence instead of empowerment which may lead to subsequent difficulties in ensuring sustainability, particularly

when there is high volunteer turnover. In our experience it is a rarity that an NGO is not acutely aware of limitations and, indeed, we will go to propose that an NGO’s alertness to such constraints is of significant value to attaining appropriate and sustainable technological interventions through collaboration in ICT4D projects.

III. HCI AND ICT4D

To consider what research approaches are appropriate in co-creating knowledge between researchers, NGOs and communities particularly with technological intervention projects in developing countries, Human-Computer Interaction (HCI) is chosen within the sub-discipline of ICT4D to reflect on the convergent evolving trends of participatory development and technology and how, in some quarters, the term HCI4D has become synonymous with ICT4D [7,10,13].

Since the middle of the last century various computing and data processing endeavors have aimed to improve socio-economic conditions in developing countries; first, assisting disadvantaged or impoverished populations indirectly via government and large non-governmental and aid organizations. During these years HCI, as a nascent field of Computer Science, drew upon ergonomics and engineering to optimize the fit of the man-machine coupling. However, by the time we started to apply the term ICT4D to the ever increasing range of approaches and deployments of technology-based solutions, HCI had matured. By the mid 90s, HCI drew on cognitive psychology to model the user’s dialogue and actions in interacting with a computer in a given environment [38].

The information theoretic view of ‘second wave’ HCI [19] considered the mind and computer to be symmetric, coupled information processors working on different parts of tasks. An extensive set of methods to focus design, usability and evaluation on the user’s side of the task emerged as part of the paradigm of User-Centred Design (UCD). Increasingly UCD methods aimed to respond to pressures to internationalize interfaces; for instance, by adapting and localizing usability methods to specific countries or using cultural models of how people work and communicate. Parallel to the shift in ICT4D, from the telecentre model of bringing information to poor communities, UCD extended beyond the design of computer interfaces to the design of other artifacts [38]. UCD methods and evaluations offered scientifically validated benchmarks and results to measure the efficacy of ICT4D projects. However, unfortunately, most UCD tools have proven un-replicable in developing community settings [13, 30], while objective or positivist notions, which may be politically powerful, are at odds with local practices. Importantly, while many ICT4D projects

claim a UCD approach, bound up with social orientations, they are, at core, techno-centric: that is to use UCD methods support the design of some technology rather than realizing that technology itself may not be an appropriate solution.

In parallel to the advent of the Millennium Development Goals and the increased investment in ICT in developing countries, HCI undertook another shift. With increased technology ubiquity in industrialized countries the discipline absorbed sociological views to explain the meaning of interaction and the social situation of interaction [20, 42]. For instance, socio-technical studies in the field of computer-supported-collaborative work revealed divides between what we need to support socially and what we are able to support technically and difficulties in generalizing between seemingly similar contexts. Insights obscured in the earlier information-theoretic view of interaction, and core to many of UCD methods, are revealed by socially situated methodologies such as participatory, value-sensitive or user experience design, ethnomethodology, embodied interaction and interaction analysis.

The ‘situated-paradigm’ of third wave HCI Harrison, et al. [19] lends itself to focusing on the context that solutions need to target. That is, in principle, it does not assume that design conventions and practices will readily transfer across continents, cultures and socio-economic strata. A corpus of literature indicates a singular transfer will lead to failed or mismatched interventions [7,13] and that design should be generated from a deeper and more comprehensive understanding of ‘culture’, both micro and macro, rather than just technology. To fully engage with the particular issues that plague mainstream ICT4D work [7] and the inclusive approach needed for ICT4D [21] we need to take radical steps to examining the paradoxes in which HCI for development sits, be that with respect to addressing policy, training technologists in developing countries [4] or interacting with communities at grass roots. While HCI moves to becoming more inclusive in terms of context, ubiquity, values and timing; a development-sensitive HCI begins to emerge that deals with practices and issues around designing and implementing technologies for developing regions [7, 24]. These cover a great range, and contrast with the formal and, in many cases ‘Western’ HCI, methods [ibid]. For instance, they may consider alternative forms of literacy without taking a ‘deficiency perspective’ [3], social awareness and, expression and co-generating projects based on Indigenous philosophies [2].

Here we focus on three aspects of the situated HCI paradigm which lend themselves to ICT4D projects: flexibility, creativity and evaluation. The paradigm enables technologists to adopt more reflexive, flexible, interactive and iterative process that adjust to the development needs rather than more rigid scientific methods. This need is nicely

illustrated by the five stages typifying an ICT4D project lifecycle, as proposed by Microsoft’s technology for emerging markets (MS-TEM) group [12].

Wonder: Recognition of the size severity of a particular challenge in a community.

Exuberance: Excitement that arises from devising an initial technical solution.

Realization: This is the phase where reality dawns that the devised solution will not work as the actual problem actually lies somewhere else.

Adaptation: Creation of a new solution that solves the real problem.

Identification: Identification with the users that often explains the mismatched solution.

The MS-TEM model illustrates a striking quality about creativity in designing to address human, rather than simply engineering problems; that is, we understand the problem by creating and testing solutions. Many fields in design, such as Computer-Supported Co-operative Work [14], widely accept that planning for reflection and adaptation of techniques and outcomes is core to learning about, and designing to address, human problems rather than realizing this knowledge at the completion of a project. Action Research methods do just that.

By drawing on Action Research methods and the situated paradigm of HCI, technologists can go beyond UCD and observe the increased value of identifying user needs within an ongoing co-production process. Next we consider how planning for reflection and identification in the HCI design process can align the “resources of formal academics or technologists to complement rather than negate progressive civil society experiences” [5] and, more specifically, achieve a mutually beneficial relationship between NGOs and HCI.

IV. THE HCI-ICT4D/NGO INTERSECT IN ACTION RESEARCH

The situated HCI paradigm runs parallel to the Action Research methodology as they both attempt to solve significant human issues through a participatory relationship of knowledge production which help to improve human life [40]. Thus the combination of situated HCI and Action Research aim to be a research method dedicated to social transformation and high quality social research. By addressing the identified similarities between HCI research and Action Research, the authors can then move forward in identifying the relevant intersections of using this methodology in suitable research work between researchers and NGOs. Some of our own experiences align with the Ethnographic Action Research (EAR) [44] approach, which combines participatory techniques and an ethnographic

approach and identify with HCI. However through the combination of both research methods, we find the synergies of working within both development theory and the HCI paradigm and finally share a language of participatory research in both disciplines.

Here we consider ways to maximize the outcomes for all parties particularly within a NGO and researcher relationship and opportunities of knowledge co-creation. We combine Reason and Bradbury's [39] characteristics of Action Research: a) knowledge-in-action, b) human flourishing, c) practical issues, d), participation & democracy, and e) emergent developmental form to the situated HCI paradigm characteristics of flexibility, creativity and evaluation. Both Action Research and a situated HCI paradigm ask researchers to be flexible and adaptive in meeting the practical needs of the community, allow creativity to flourish within human choice of endeavors and consciousness and finally the need to be evaluative and reflexive when investigating their own emerging developmental form of community and society. The reflection of Reason and Bradbury's characteristics in developing country contexts can occur in parallel at different points in the methodology of situated HCI research.

1) *Knowledge-in-Action: Participatory Research*

In a participatory worldview, knowledge is produced through one's various engagements in different relational encounters and actions taking upon the world [Lincoln in 39]. The "knowing-by-doing" allows the involvement of NGOs and technologists through mutual relational awareness of new forms of knowledge. As research allies, NGOs afford something of an 'insider' view of user's needs, the problem-space and an in-depth appreciation of relationships with the target community. Researchers are usually outsiders to those communities culturally, educationally and by language. However, through working together with an NGO, we can identify indigenous knowledge and practice which can help especially early in the design process. Such a voice from the local persons can help to avoid a basic cultural mismatch of technology and its use.

As intermediaries, NGOs act as proxy-users and hence can be representatives of those who are unable to articulate their needs in ways which are accessible to technologists. NGOs are treated differently by communities; for instance, Bartunek and Louis [1] note that communities perceive researchers as visitors with less enduring local impact than NGOs. This perspective can be mitigated through an NGO within the ongoing process since its community fixture brings a sense of longevity to the technological interventions. NGOs remain in communities even after technologists have left the field allowing for knowledge exploration of a problem space far beyond the research issue at hand. In such account, the NGO and community can further their process on learning and consciousness raising.

Successful NGO-technologist collaboration means knowledge-building and problem solving must benefit the NGOs work in the community: be it in terms of staff skills development; creating a tool that aligns to their goals or in the very least publicity. In some cases NGO staff can feel cheated and exploited as their input is drained with little to return; however, technologists can be useful agents of change and catalysts for knowledge generation. As outsiders technologist bring extensive experience and possible solutions [26] that can ignite changes directly through technological intervention or, indirectly, through interaction. For these to bring maximum impact there is need to understand the NGO's strategies, in the context of the target community, and temper our pre-defined questions. Taking an Action Research perspective is a useful position to ground insights on the NGO-community relationship and approaches to intervention in participant observation and reflexive techniques. There is also need to follow-through, ensuring that dissemination of projects goes beyond academic papers and raises awareness of an NGO's work in wider media, or giving community voice to their realized new forms of knowledge.

2) *Human Flourishing: Nurtured Creativity*

The purpose of Action Research is to achieve the "flourishment" of life [39]. The researcher enquires the meaning of a flourished life whether it is improving human capabilities or becoming conscious of one's purpose [39]. The empowerment of an NGO in the design process is tantamount and involves designing in creative ways that the process can deliver direct, tangible benefits to researchers, staff and local community. This is in contrast to the fair partnership model, where the roles of the technologist and NGO staff are clearly distinguished with respect to design decisions. We recommend starting with a supportive position to technological change in general by providing training in basic technical support to an NGO. For instance, technologists invest time in assisting them with their more general needs, such as installing software or, more cautiously, suggest ways that they can perform existing tasks more efficiently [27].

These activities may appear tangential to our goals of innovative design but they bring the participant-observer perspective on a NGO's own relationship with technology. That is, the researcher helps to build technological capacity within the NGO, and ultimately, integrates the NGO's time to enable them to participate in more direct design activities. In building their skills, NGOs undergo transformative participation to strengthen their confidence in creating change. But, more importantly, we also undergo transformation so that our supportive role helps us to surrender ownership of creative processes, build skills in cross-cultural teaching and ensure that the design process fits appropriately with the NGO's work and engagement with the community. For many technologists the design process of ideation and prototyping is usually the 'fun' part and where

we build our research capacity through the intervention.

To challenge our hold on this we are beginning to practice ways to involve “local researchers” [49]; that is, members of the community linked to NGOs who undertake elements of situated data gathering, design ideation and prototype tests. This, unequivocally, enriches design and contributes to team building and networking within the community which nurtures technology-championing locally. Wherever possible we strongly recommend sustaining support beyond the project, even remotely. Such creative suggestions can carry less overhead than might be predicted; the several NGOs with whom we have maintained relationships over several years through such means as answering emails or phone calls to troubleshoot, have not consumed significant research resources.

3) *Practical Issues: Implementation and Flexibility*

As we engage in Action Research, we find the hands-on participation is the purpose of knowing or gaining knowledge and our intellectual actions strengthen our chances to lead worthwhile purposes [39]. Given these considerations, it allows us to be flexible in pursuing our knowledge quest. NGOs often implement and adapt their work based on grassroots networks that are attached to the local community or are closely engaged with it (e.g. volunteers, social workers, activists). Often, despite the goals of socio-economic development, major development agencies prefer to communicate vertically, in contrast with the participatory approaches to dialogue necessary for an NGO to engage at the community level. An NGO’s community level dialogue aligns well with the ethos of Participatory Design (PD), even though implementation requires adaptation from PD’s origins in Scandinavian change management. In the original system, democracy is assumed and entire user groups are present throughout all stages of design [35]. However, at core, the ethos of participatory approaches infer dialogue to share understandings to articulate and negotiate social relations between people e.g. [15]. Social relations and shared meanings are keys to an ICT’s sustainability, scalability and adaptation to a community’s needs, abilities and values. As a participant in one study states:

‘To understand the many dimensions of participation one needs to enquire seriously into all its roots and ramifications, these going deep into the heart of human relationships and the socio-cultural realities conditioning them’ [41].

The ways in which communities create and share meanings requires sustained observation and participation of a range of relationships beyond a technologist’s scope. But an NGO’s conversancy with local culture, language and communication practices can translate participation, manage local expectations and negotiate the complexities of community systems, such as those that are strongly hierarchical and oriented by chieftdom or village chairman authority. Attempting to bypass cultural and authoritative structures,

such as meetings with traditional leaders, not only disrespects dimensions of community participation but loses valuable project time and increases bureaucratic barriers. We propose that NGOs can bring a pseudo ‘representative democracy’ by representing community members and acting as proxy-user in owning and driving the design process. As proxy-users they bring a view of mundane, but easily overlooked, constraints that are critical for sustainability such as affordability, environmental conditions (e.g. lightning, electricity, dust) and human technical ability (i.e. computer literacy).

4) *Participation & Democracy: Influence on Policy Change*

According to Reason and Bradbury, Action Research emphasizes participation of all stakeholders under a democratic peer foundation [39]. Generating knowledge through Action Research demands an equal involvement in a community’s political processes [39]. NGOs can provide leadership to communities by strengthening under-represented participation as well as representing them in political processes in support of an equitable democratic society. An NGO may be able to assemble grassroots momentum for improved social service delivery and thus invoke pressure on government to provide change in their respective communities. NGOs and ICT4D research also share responsibility for an awareness of the effect of certain laws and regulations on their operations, projects and communities; whether that be, for instance, an NGO registration to government or the licensed use of wireless fidelity (WiFi) for public use. Further, NGOs and technologists must be able to map how the current policy environment does not help the poor and investigate evidence, or intervention pilot studies, which demonstrate the need for changes in practice and law.

Reflecting upon the design of interventions with NGOs, one can illuminate, for researchers, the ways that certain types of political privilege can leverage certain sets of social, technical and literary devices in technology and design practices. For instance, to protect local resources communities may draw on the positivist representations of space and ‘Western’ cartographies embedded in geospatial technologies [10] while, to achieve development agendas people may draw on formats derived from English-language journalism in digital storytelling [4]. These technical and literary devices ‘give voice’ by assimilation but can, simultaneously, suppress and displace local practices of community participation. These devices are often taken-for-granted in the ‘a sine qua non’ of ICT4D research which obscures how they may disenfranchise user communities. Collaborations with NGOs thus begin to shift local accountability in design to the site of the technology intervention.

Certainly researchers do not always have the best link to governments in other states or the ability to communicate their complex methodologies and research findings using

effective or clear strategies [25]. However, ICT4D research can complement and align with the strong, unambiguous voice of NGOs. Research provides NGOs with convincing evidence which adds value to their advocacy work. Research findings, arising from participatory means, can inform policy and support their government lobby for improvement within the community. Such ICT4D research can help to influence an NGO's current communication strategy efforts through changes in policy agendas, official government documents, public budget spending, social service implementation, and other activities.

Technologists must design, from the beginning, their applied research projects in collaboration with a NGO's policy advocate (and ideally with policy makers) with reference to specific development policy or practice. Technologists must also dedicate time to share their research results and evidence back to the NGO and community in easy-to-understand language since participation and transparency are part of the democratic, empowerment process. In Mercer's [33] Tanzanian example, the research examines an NGO network, FemAct (Feminist Activist Coalition), and their active use of the email to inform members of their upcoming campaigns on human rights, and the web collaborations on the Internet through collective statements (being one of the few) delivered to major development agencies like World Bank.

There is some critique of NGOs main use of ICTs as global publicity (such as for funding) and symbol of status and modernity that is unreachable to the rest of the rural population. However, the 2004 Mercer's study provides a good example of networking of NGOs for policy change even within a resource-limited environment. An NGO can leverage participatory research results in campaigns for local public pro-poor policy and draw attention to the precise ways communities are disadvantaged.

5) *Emergent developmental form: Continuity, Monitoring and Evaluation*

Reason and Bradbury define emergent developmental form in Action Research as this change of thought which is reflective of our own consciousness and our linkages with the world around us, both human and not [39]. We co-create and acknowledge the "expression of its intelligent and creative force" from the participation with the all humans and the earth [39].

Monitoring and Evaluation (M&E) is an important part of reflecting on the social behavioral changes that are taking place within the community within Action Research cycles but an aspect in which many ICT4D projects fall short on [21].

HCI and UCD have developed standard measures of usability for assessing technological artifacts using specific definitions of what is usable. According to the ISO 92411 and ISO 13407 standards a given technology is deemed as usable

if it is used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use [24]. Nielsen [35], on the other hand, describes usability in terms of specific characteristics including learnability, efficiency, memorability, errors and satisfaction. These quality measures and standards are well intentioned and important in designing technology in relation to the user satisfaction; however, the literature is awash with reports on the incompatibility of evaluation methods with different cultural settings. For instance, after studying cross-cultural evaluations on three continents, Oyugi et al., [37] concluded that even an evaluator situated in the users' culture can not compensate for methods that are inappropriate to the context. Winschiers and Fendler [49] inspected the underlying values and meaning of concepts inherent in usability evaluations; they found that Namibian user groups did not prioritize effectiveness and user satisfaction in the way we typically evaluate "usability". There are many instances in ICT4D literature where an artifact was designed for a specific use, but the users appropriated it to meet a different need, which, according to pre-defined ill-fitting usability measures, would be deemed 'mis-use' or 'under-use' [21]. For instance, when [31] designed a public information system based on cellular phone handsets, a Bluetooth connection and a public display, he intended the system to provide social service information to disadvantaged community; however, to his surprise the group appropriated the tool to share entertainment content, such as music and videos.

NGOs often have experience in outcome evaluation tools, mechanisms through which to predict such occurrences and counter measures to maximize on the resources when mis-use or under-use of their interventions occur. These are issues that can be addressed by using a combined M&E approach: one that checks the physical design artifact and another to look at the implementation and actual usage of the artifact irrespective of the envisaged form of use. The former motivates the project's technical definition and the latter the project's social impact.

V. REFLECTIONS: OUR EXPERIENCES WITH NGOS

By approaching the situated HCI paradigm from the five characteristics of the Action Research approach, we start to align technologists' and NGOs' objectives towards a mutual purpose. Our observations of intersections between NGOs and HCID technologists are informed by our continuing work with various NGOs in Africa. Thus, here we highlight some of these NGOs and the extent in which we have co-operated with them. We have selected two grassroots and two national NGOs.

In all the four NGOs, the authors were linked to the NGOs through existing links with colleagues or researcher who had previously worked with the NGOs. To have successfully worked with the NGOs, the authors' initially had to gain the

NGO's trust by aligning their project goals to the NGO's ideals and mission. The NGOs were made an integral part of the project, through technical support and skills development of their staff. Finally, in two instances, the NGO owned the project and determined what the next stage would look like.

1) *Transcape*

Transcape is in a remote, rural and highly impoverished district of South Africa. It originated from a collaboration between the owners of guest lodgings, local community members and medical staff at a highly impoverished local hospital. Transcape's ethos is acutely community centered and sensitive to the need local Xhosa people who now constitute half of Transcape's six active board members and 85% of its 29 employees (the information about board members on its web-site is not current). Transcape's projects include HIV/AIDS awareness, treatment and care; health promotion and village-based care; education; small-scale agriculture; job creation, and natural resource management.

ICT initiatives with Transcape were initiated six years ago during the design and prototyping of rural tele-health systems at the hospital and village clinics [9,46]. At the early stage of the relationship Transcape's enthusiasm for tele-health was represented by one person while others held reservations about the role of technology. However, the principal investigators on that project sustained support to Transcape by maintaining a highly robust point-to-point wireless network between villages, assisting with Transcape's Internet infrastructure and introducing and supporting other technologists in the area. This relationship enabled author three to forge a link with community members in a more remote village and undertake deeply, situated ethnographic research [3,44].

As a result of the principal investigators' reflective approach towards the rural health project [9], Transcape began to increase its own use of the Internet and community members became interested in technology for local development. For instance, when the NGO and community engaged in participatory planning sessions for the new education centre community members requested that Transcape install computers, then some members, previously involved in the tele-health project, became trainers at the education centre where people use computers to learn to read and gain literacy certification. Over time, Transcape increasingly leveraged the Internet to fund-raise and included computer infrastructure in major proposals. Indeed, the NGO has recently been awarded significant funds to support integrating computers into home-based care centers and other applications for community health initiatives. The emergence of Transcape in driving ICT initiatives is a testament to both the sustained support by the principal researcher and their mutual openly discursive and reflective approach. Such engagement has enabled us to undertake research situated in

the community [2] and explore other applications. For instance Transcape hosted design workshops which led to our prototyping a digital story-telling application [4] and from this we gained research funds to further explore, with Transcape, other aspects of community-generated content.

At a policy level Transcape currently focuses on informal representations with regional government for general socio-economic change and with national and international bodies in the area of HIV. However, conversations with Transcape and reflections on issues in the tele-health project have informed ICT policy discussions via one of the research collaborators.

2) *Learn to Earn*

Learn to Earn (L2E)¹ is a faith-based organization in Khayelitsha, Cape Town. Its aim is to train and equip unemployed persons in various skills (e.g. sewing, garment making, carpentry) so that they may become self-supportive and independent. L2E is not an ICT intensive organization as most clients are semi-illiterate people and are assumed to have little interest in ICT. However, L2E does have a web portal through which it sells the merchandise made by students and offers two levels of computer courses, an introduction to computer course and a course on desktop publications and graphics.

L2E has offered various research and design teams access to the larger Khayelitsha community. In one project the centre facilitated our access to a group of semi-illiterate women to study first time mobile Internet. We started by training a group who had never used the Internet [16] which revealed aspects of mediated or facilitated interaction. We observed that, due to language barriers with the lead researcher, participants sought advice and help from each other or an NGO staff member they believed more knowledgeable. This interaction led us to involve some of the computer-literate NGO staff who were interested in the community's well being and believed in the benefits of Internet use on their mobile phones. In an on-going study we are designing several mobile Internet based applications with the assistance of L2E staff that responds to community needs and accommodates these alternative forms of interaction. We intend to enable the NGO to introduce and evaluate the efficacy of applications in the community. Here, the researcher steps back to just providing the technical support in improving the applications to the changing needs but allows the NGO to take lead in introducing and evaluating the intervention.

Being faith based, L2E has limited direct ability to serve researchers in policy changes. However, as a member of a network of empowerment NGOs in Khayelitsha, L2E has been able to make policy recommendation to government on steps towards economic empowerment. The L2E model of

¹ <http://www.learntoearn.org.za/Khayelitsha.htm>

empowerment through skills development has been replicated by other development oriented organizations in South Africa which offers potential for both developing relevant applications and also scaling these to areas the organization has influence.

3) *IDASA/CMD*

The Institute for Democracy in South Africa (IDASA)², is an independent public interest organization committed to promoting sustainable democracy based on active citizenship, democratic institutions, and social justice. It started with the aim of finding alternatives to the politics of repression, to explore new ways of addressing polarization between South African racial groups and facilitate talks and negotiations between the political factions. Having successfully organized some of the landmark talks towards South Africa's integration, IDASA now boasts programs in most southern and central African states, with plans to expand to the rest of Africa. In order to achieve their mission, IDASA has integrated both new and old ICTs including community radio and TV programs, monthly newsletters, an up-to-date Internet portal and social networking services. A presence in all forms of media aims at total inclusivity of citizens. These activities are run by a dedicated media office.

Another organization, the Centre for Multiparty Democracy in Kenya (CMD-K) has a mission to facilitate the growth of and perpetuate multiparty democracy through capacity building of political member parties. Started with the aid of the Dutch government, CMD-K's programs facilitate citizen participation through partnership media outlets. Additionally, CMD-K has a web portal that brings all member party organizations on one stage. CMD-K facilitates dialogue in various formats including public meetings and is an opinion leader through weekly columns in a national newspaper.

Our involvement with both IDASA and CMD was to explore ways in which mobile phones can further their active citizenship work. During the study, research teams introduced the Big Board (BB) [31] a public information system that allowed sharing of multimedia tools using large public displays and mobiles phones via Bluetooth transfer as complementary media for voter education. Using a participatory design approach, the team designed a PC based application that would allow NGO staff to create, manipulate and upload media onto the BB which could be accessed by voters on their mobile phones. This media could be adjusted and cycled to suit various voters' needs, through a drag and drop interface matched to NGO staff's familiarity [31]. Cooperation with NGOs during the study ensured that we could develop appropriate solutions for information dissemination by providing us with an understanding of

voters and voter education processes. However, importantly, it also demonstrated the NGO's ability to measure the envisioned impact using their standard monitoring tools and enabled the NGO and team confident evaluation of the system's efficacy during a voter education process.

4) *Women'sNet/APC-W*

Women'sNet³ (WN) is a feminist organization that works to advance gender equality and justice in South Africa through the use of ICT. They provide training and facilitate content creation and dissemination that supports women, girls, and gender organizations and networks to take control of their own content and ICT use. WN has a vibrant online presence with a dedicated portal, as well as special networking site on Ning. They also have an active presence in all major social networking sites.

The APC Women's Networking Support Programme (APC-W)⁴ is a global network of women who support women networking for social change and women's empowerment, through the use of ICTs. It is part of the Association for Progressive Communications, an international network of civil society organizations dedicated to empowering and supporting groups and individuals working for peace, human rights, development and protection of the environment, through the strategic use ICTs, including the Internet.

WomensNet in partnership with APC-W have developed a program of using various forms of media to educate women on various societal issues. Through their network of grassroots organizations they have managed to identify ICTs that work best for mostly illiterate women. One of their current interests is the use of mobile phones and ways to create and disseminate audio and video content. Our partnership provided an opportunity to further test the mobile digital telling application, with their rural member organization in South Africa's Western Cape province. Based on the potential of this application and other applications they use, the partnership is in the process of drafting policy documents to lobby the South African government to integrate mobile phones as a strategy to fight violence against women.

B. Recommendations from Our Analysis of our NGOs

NGOs and ICT4D technologists share commonalities in working with communities in a participatory manner, have the ability to work in adverse situations and attempt to innovate with flexible and adaptive practices. Both also attempt to better understand communities through research to bring positive informed change in developing countries and aspire to build their skills and confidence in designing worthwhile interventions.

Through an analysis of the Action Research approach completed by the four selected NGOs (Table 1), each NGO-

² <http://www.idasa.org.za/>

³ <http://www.womensnet.org.za/>

ICT4D team has met at least three or four stages of Action Research. The teams have demonstrated efforts in collaborative research work and facilitated design for appropriate community usage of technology interventions. The reason that these two stages are well adopted by the teams could be the ability to build trust between the NGO and technologist, the previous experiences, and the willingness to try new techniques for potential development change. At the moment, many technologists, including ourselves, have yet to apply two important elements of Action Research: skill transfer (appropriate training) to local technicians who will maintain technology and influence on policy change. While they scored highly in the M&E criteria, an adaption of the outcome monitoring tools used by NGOs which meets both the technical and social evaluation needs of ICT4D research is also required for successful ICT4D-NGO interaction.

A mechanism that helps technologists shape their interventions and help to resolve current policy approach deficiencies is needed. This missing intent to influence policy particularly when attempting to work with a local NGO must be addressed if technologists wish to see their projects demonstrate genuine sustainable change within the local communities. While policy changes can take a long time, NGO-ICT4D teams can mutually plan on selected strategies which foster influence amongst policy makers. Secondly, a reason for weakness in sustainable skill transfer to an NGO could be that good training can lead to high turnover as technicians become more qualified for better paid positions. One suggestion is to strategically train individuals who are deeply rooted in the village and have less reason to find work beyond the community.

NGOs and technologists need to develop that common language in order to effectively share information about their external environment, pro-actively collaborate hand-in-hand at all elements, and express their needs within a project. NGOs and technologists have strong opportunities to drive sustainable change in their communities and many of which can be realized through usage of alternative research approaches such as Action Research.

Table 1. Action Research analysis of selected NGOs

NGO/AR Steps	Research	Design	M&E	Policy Change	Training
Transcape	x	x		x	
L2E	x	x	x		
IDASA/CMD	x	x	x		
WN/APC-W		x	x	x	x

VI. CONCLUSION

We have shown that the critical roles NGOs play in the development agenda and their experience and influence in

underprivileged communities can scaffold ICT4D. Currently ICT4D underutilizes this resource and we tend to view NGOs as allies rather than drivers in research and design processes. We analyzed the opportunity for advancing from this position using the lens of Action Research as it appeals to both methods that have been successful development projects and to features of the situated paradigm of HCI design. Our analysis draws attention to the valuable role NGOs can play in monitoring and evaluation of technology and their potential in influencing the policy changes needed for those technologies to fulfill their potential.

NGOs can act as proxy-users to mediate between the community's needs and technology solutions proposed by researchers. This can streamline community resources and can improve the research efficacy and researcher's understanding of users. However, despite our enthusiasm we also flag a disclaimer. Not all ICT4D projects will work perfectly with an NGO as proxy and not all NGOs will act as good proxies to the community. There will be times when researchers must go directly to a community to gather data (such as in our Transcape example). Thus, our purpose is not to eliminate the need for individual interactions but rather to augment and enhance research practices with respect to the role of NGOs in ICT4D.

Many NGOs already act on behalf of communities to inform governments and other development stakeholders of their socio-economic needs and, in reverse, they can be used by the stakeholders to mobilize communities. However, there remains some way for technologists to better respond to the wider developmental context of technology in the design in ICT4D.

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⁴ http://www.apcwomen.org/about_wnsp

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