Localize-It: Co-designing a Community-Owned Platform

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Abstract. One of the most difficult, yet undocumented, aspects of information and communications technologies and development (ICTD) projects is that of establishing partnerships around which researchers' interventions will develop, be tested and grow. Constraints on timing and funding usually lead to short-term projects, in which benefits are biased towards researchers rather than the partner community. In order to avoid empty and unethical promises and to increase the potential benefit for the community, we consider the process of developing participatory partnerships in ICTD projects. The objective is to make the project community owned, allowing the participants to develop what they value as important. Using the case of a township-based wireless community content sharing network, we describe the potential and some of the challenges with this approach. The paper highlights building blocks, such as ethical behaviour and trust, to avoid recreating the dichotomy between research and practice, and building a constructive collaboration.

Keywords: ICTD · Partnership · Community wireless · Ownership

1 Introduction

There is no clear formula for how to make an information and communications technology and development (ICTD) project successful, despite the many theories around why they fail. Many emphasise the importance of project champions and community intermediaries [1] to help facilitate connections and translate local knowledge, but this leaves projects vulnerable to a single point of failure [2] when a project champion seeks opportunities elsewhere. Toyama [3] suggests that technologies are an amplifier – that they fail because they cannot replace gaps in existing institutional and human capacity, but, rather, can multiply both negative and positive capacities where they already exist. Design-reality gaps [4] suggest the problem lies in the technologists – that they are designing without an understanding of reality. Others suggest that participation is the key; it helps eliminate design-reality gaps through efforts done with the stakeholders, rather than merely for them, and factors in existing institutional and human resources [5]. Given all of this advice, how should ICTD

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researchers go about establishing the partnerships around which we can engage with communities in the use of information and communications technologies to address their needs?

The norm for much ICTD research is for researchers based in another country to find a collaborating organisation or community in a target country, and to fly there for short periods to do data gathering and deployments [2]. In these cases, immersion can be prohibitively expensive, and relationships are built over many relatively short visits, or worse, not built at all (a.k.a. bungee research). However, as researchers based in Cape Town, working in a township in the same city, we have the opportunity to develop deeper relationships over a longer period with our collaborators. In this paper we reflect on this type of participatory partnership, and the ways in which we are working together with two communities to realise shared objectives. The iNethi project is an effort to co-design a community-owned wireless network to support local content sharing and services, and to lower the cost of using the Internet. Because of the many challenges present in participatory design approaches, such as sustainability and the risk to deploy 'white elephant' projects [5] that are abandoned soon after their creation, we tried to co-design a project in a different way – in particular, trying to avoid the dichotomy research-practice. While pursuing this aim through the creation of a fruitful partnership, during the initial phase of the project we created the conditions for what we believe is a more ethical approach. In this approach we value local ownership and local service and content creation in our co-design, in order to foster sustainability. Since we are still at the beginning of the project, there are many open questions. We use this case to outline some of the key principles to keep in mind while developing long-term collaborative ICTD projects, and to discuss some of the associated challenges entailed.

Section 2 provides background information about community networks and their objectives. Section 3 presents the methodology used. Section 4 outlines our activities so far, and in Sect. 5 we discuss these activities with respect to theory. The conclusion highlights the potential offered by relationship building for research and practice in ICTD.

2 Background

2.1 Community Wireless

Community wireless networks are bottom-up projects in which communities use affordable wireless networks such as WiFi-based mesh and other technologies to set up communications infrastructures for themselves, often in locations where mobile coverage is lacking, or costs are prohibitively high. Community networks can support the building of local economies, and open up new possibilities for underserved areas [6].

In the context of developing countries, there are several fully operational community networks in deep rural areas of South Africa (Zenzeleni, [7]), in Zambia (Macha) and in Mexico (Rhizomatica). Most community networks currently focus on provisioning for phone calls and global Internet access; however, by virtue of their proximity to the end-users, community networks also offer an ideal platform for sharing

content within the community, whether through caching of commonly accessed global content, or distribution of content they have created themselves. Each of these projects were affected by a series of embedded community connections and relationships, and achieved results because specific goals of the project were met. Macha lowered barriers to Internet access [8]; Zenzeleni tried to solve the affordability issue; and, Rhizomatica brought coverage where it was not available, and reduced communication costs for the population.

For the iNethi project, communications technology is not just about connecting to the rest of the world, but a service that communities can use to connect community members, as well as nearby communities. While affordability of Internet access is a recognised problem, the team of researchers and community representatives highlighted, as a priority, to build up infrastructure to support community-based services and content sharing.

2.2 Local Content Creation

Studies of existing use bolster our argument for using communications infrastructure to support local content creation. Phokeer and colleagues have done a preliminary study of mobile data usage in the communities where the iNethi project is based, finding not only constrained usage of mobile data, but that much of the interaction and content sharing was between people within the community [9]. Yet for the most popular applications, including WhatsApp and Facebook, messages destined for neighbours across the street must first travel the world over expensive and constrained data links. iNethi reduces costs by offering community-based services and content sharing of music, video, voice and images that remain locally based.

In addition to studies related to the local use of the network interaction, an increasing volume of literature is interested in the type of content shared. Due to globalisation, local economies and cultures are under threat, and this is amplified by modern communications technologies. This has resulted in increased attention to local cultures, and their distinctiveness is emerging in academic literature. In particular, in the once so-called developing world, attention is turning towards the use of ICT to preserve indigenous knowledge (IK) - the unique, traditional and local knowledge existing within and developed around the specific conditions of women and men indigenous to a particular geographic area [10]. IK is embedded in the community and is unique to a given culture, location or society [11].

Management of local and indigenous knowledge, especially culturally sensitive and unique knowledge, implies a need for gathering existing information, resources, and processes to store and distribute the collected data. On the one hand, preservation of indigenous and traditional knowledge involves discussion about its access and stakeholders' intellectual property rights. On the other hand, protection of property rights should not prevent the community from sharing and partaking in local knowledge generation and protection of local values. ICT can support knowledge management: both the preservation of local traditions and the potential amplification of local culture, for the benefit of the community and beyond. ICT in both scenarios can assist in gathering, storing and sharing local content and knowledge, as well as creation of new

content and knowledge. Attention would be required in dealing with the ethical principles and in consideration of the technological deterministic risk [12].

2.3 Ocean View and Masiphumelele

Despite tremendous growth in Internet-capable mobile device adoption, Internet usage and access to data is limited in South Africa by prohibitive costs and unequal coverage. The research is based on a project which developed in two under-resourced communities in Cape Town: Masiphumelele (a.k.a. Masi) and Ocean View.

The two areas differ in their composition. In particular, as presented in the 2011 Cape Town census, the Ocean View population is predominantly Coloured (91%) (multiracial ethnic group native to Southern Africa); 48% of households have a monthly income of R3, 200 or less (slightly more than $200 per month); 84% of households live in formal dwellings (leaving a significant percentage of the population in informal buildings – shacks) [13].

The key results emerging from the 2011 census for the suburb of Masi highlight a population that is predominantly Black African (91%), and where the percentage of people living behind the poverty line of R3, 200 per month is higher than in Ocean View, reaching 82% of households. A limited 27% of households live in formal dwellings. An elevated presence of non-governmental organisations (NGOs) characterises the community environment where the civil society recognises their capacity to meet their daily needs [14].

Initial research results for the two communities show that Internet access is not affordable for most users, due to the high costs of cellular network data packages. The alternatives to access the web at affordable prices are limited, considering the reduced presence of public Wi-Fi and the non-availability of the services offered by the public schools at night and during the weekends.

2.4 Overview of the iNethi Approach

The iNethi Network provides wireless backhaul over a television white spaces (TVWS) and WiFi mesh network and an access network to user devices using WiFi access points. Mesh networks are used as they provide a simple set-up (self-forming) and repair process (self-healing) when radios in the network fail or lose power.

The platform allows users in the community to communicate, share information and to generate new local content. To this end, the project is building mini data centres called “cloudlets”. The cloudlet currently hosts different services running on individual containers. The current proposed services are (i) Diaspora: a Decentralized Social Network; (ii) OwnCloud: a file sharing application; and (iii) RocketChat: an instant messaging service. The services are running in docker containers on a main host connected to a wireless Access Point (AP). The AP serves as an entry point for end-users who connect to the iNethi SSID. Once the users are connected, the devices can connect to the different services running locally on the cloudlet. The iNethi cloudlets are able to synchronise to other available iNethi cloudlets via a wireless network and/or via a global cloudlet server using an Internet link.

3 Methodology

Key to our framing of this research is to take a participatory co-design approach, working with the community to establish needs, norms and other project aspects.

Authors on this paper include both academic researchers and community members from the Ocean View township. We are an inter-disciplinary group, with expertise in networking, information systems, human-computer interaction, education and community development. Our authors from Ocean View have additional expertise in contextualising the work, connecting us to other people in the community, but, more importantly, helping us to define parameters for our partnership.

Thus, for this paper, we have all been engaged in participant observation – noting and reflecting on our activities. As themes have emerged, we have discussed aspects that we considered to be most important, always working to ensure that the community voice is given prominence.

The participatory and reflective methodology was maintained along the project, facing the upcoming challenges. The description of the activities in Sect. 4 covers the most important moments. These events, discussions and decisions taken represent the turning points in the development of a project that was not pre-designed before the deployment. The initial encounters took place with community representatives to verify the possibility to collaborate after a researcher noticed a commonality of intentions with some activists. The initial phase saw the involvement of more people interested in participating from both the community and the university. Several workshops followed, as well as the eventual establishment of a governing board for the project. The ethical issues, such as usage policies and privacy, required the researchers to explore temporary and long-term solutions while ongoing community engagement was taking place. In the short term, the team decided to deploy an iNethi server and WiFi hotspot at the school, while discussing its potential to test the people's interest, capacities and commitment.

While developing the activities, the mixed team could reflect over the approach, test this against the needs of the people, and adjust the platform where needed. The main result of this process is expressed by the philosophy adopted by the local and external participants.

4 Activities

In this section, we detail the partnership development activities entailed in setting up the iNethi project. As stated previously, we are still in the very early stages of this project, having taken almost two years to establish partnerships, and to understand the needs and dynamics of the Ocean View and Masi communities.

4.1 Initial Community Engagement

A number of non-governmental organisations (NGOs) based in Masi represented the entry point for the researchers into the community. The choice to work with NGOs and community-based organisations (CBOs) was maintained while developing the

relationships with several community representatives. The community leaders started attending the meetings of brainstorming around the possibility to deploy a wireless community network. After reaching an agreement over the various activities to be carried on in the locations, the mixed team decided to officially introduce the project to some potential local partners.

In particular, a one-day workshop took place in May 2017 involving representatives of the students, of the teachers and some community leaders. The conclusion of the brainstorming with all the possible participants, resources and areas of intervention, was summarised in a poster and placed in a visible space, in order to maintain visibility and awareness of the project. In September 2017, a three-day workshop was prepared by a team composed by researchers and leaders of the two communities. The team elaborated on the programme, and discussed who could be invited and how. The community representatives spread the news over social media and during community events, distributing a flyer co-designed during the preparatory meetings. To involve potential stakeholders, the programme was presented and critically discussed with local NGOs.

Community representatives of the two townships attended the workshop. The workshop 'House Rules' were discussed at the beginning, and reflected the principles of participatory design values: respect for one another, a collaborative spirit, and a peer-to-peer approach where everybody should feel free to ask as well as answer. The peer-to-peer learning methodologies [15, 16] were used during the different phases of presentations, activities, games and discussions. The group activities were essential to give a voice to everybody, to be at ease, active and creative, and to start using the new services. Furthermore, the group activities allowed the different participants to focus their attention on the fields they felt more passionate about: community services, education, news or entertainment.

During the following months, a series of activities took place to maintain and strengthen the relationship with the community. In particular, an application to create, record and share music was developed by some university students and community representatives, in order to target younger musicians with limited technological devices and connectivity. At the end of 2017, a music festival was organised in Ocean View and this gave the team an opportunity to introduce and test iNethi in the community. The festival offered the space to deploy the technology, present the work done, experiment new uses (such as record and upload of music), connect services, and involve new artists and community members. To attract people and discuss opportunities for the community, a free local voice calls application was tested, and a presentation of Internet of Things was done.

4.2 Establishing a Governing Board

Apart from special events and the development of iNethi services and content, regular weekly meetings are taking place, involving the community leaders, several specialised researchers and, depending on the occasion, new stakeholders which can support the project. The challenges related to its establishment and growth, and potential to reach out for more beneficiaries, are connected with the capabilities to engage the community at large. At present, the main participants are activists and artists. The involvement of

the schools and religious institution representatives, as well as that of the local government, is seen as a necessary further step.

The team started the discussion over the creation of a governing board which will be responsible for the regulation of the use of the platform. The governing board might be a decentralised structure, possibly with a body section in Ocean View and one in Masi. From the discussions, the importance of diversity in the governing board emerged, such as the inclusion of women, elders, artists, activists and youth. Over time, the board will decide what services and content will be allowed on the iNethi platform by community members, and ensure that any modification of the platform is for the benefit of their community.

This decision will mark a strong distinction from the existing rules and implemented systems of the large Internet service providers, where general rules are settled without community involvement, and limited space is available for negotiation of individual and specific cases. As stated by one of the community members: "Often, applications and service providers, due to the number of users and quantity of contents shared, manage the resolution of controversies using electronic systems, globally" (John, a community activist).

The community representatives that form part of the future governing board will register the company as an NPO, to allow the community network to access specific funds to support their activities. An NPO can also generate profit that can be channelled back into project activities, such as salaries and other revenues necessary to maintain the network. The constitution of the NPO will allow the network and platform to apply for licences to operate the network (for the backhaul mesh network and access points and to supply localised services such as chat, voice, and file sharing over the network). A licence exemption, that allows the network to be operated without paying any licence fees, due to its not-for-profit status, will also be applied for.

In addition to registering an NPO, a co-operative will also be applied for, in order to support the duplication of the iNethi concept in other neighbouring communities, and to allow resources to be pooled (e.g. training workshops for multiple communities to be held, or common global cloud storage to be used among multiple communities).

4.3 Acceptable Use Policy

The governing board started operating after discussing the users' policy, and the draft of an Acceptable Use Policy (AUP) had been shared between the participants to clarify some essential decisions taken and to guide the work to come. The iNethi AUP is a framework which offers guidelines for the use of the wireless network and its services. These guidelines are solely to protect the usefulness and enjoyment of the wireless network and the users – in this instance, members of the community. The promulgated guidelines, as such, are not punitive in nature, even though there are certain consequences should these guidelines be breached.

The underlying intention is focused on community ownership, whereby the community set up and use guidelines that are acceptable to that community, and collectively agreed upon through a process of consultation and deliberation. These communities will then be solely responsible for the implementation and administration of the AUP through the governing board, which is representative of each community.

The AUP draft is designed to encompass the values, cultures, traditions and beliefs of the community to be inclusive of the cross-section of the community. The purpose of the AUP is underpinned by a legal framework, in order for users to take steps to avoid or refrain from any activity that affects the accessibility, legality and security of the wireless network. Also, the AUP ensures respecting the rights of other users, the integrity of the physical facilities, and all pertinent licence and contractual agreements. Furthermore, users are expected to behave in a responsible, ethical and legal manner.

4.4 Building Wireless Infrastructure

In the two communities, the team started building the wireless infrastructure required to support the community network. The process undertaken to involve the community to build out the mesh network faced a series of challenges related to inclusiveness and infrastructure. To ensure the coverage of the community, and disclose the potentiality of the wireless community network, the community representatives and the university colleagues discussed details about specific structures and organisations that would form ideal mounting points for the mesh radios. The team decided to install the initial AP and mesh on critical points from two perspectives. The choice was dependent on the height of the structures, the ability to reach other targeted sites, and covering as many buildings (people) as possible with a limited number of mesh radios. In addition, the decision needed to involve the owners of the building. The installation of an AP in a strategic community centre or a religious building, for instance, would open up new opportunities to start a relationship and collaboration with the stakeholders involved.

The community representatives started a mapping exercise supported by technical advice from university researchers. The initial APs were selected on the basis of the maximisation of the coverage of each community and minimisation of infrastructural issues related to power availability and vandalisation. Points of alignment with the first AP were searched for, as well as higher points in the communities. One of the community representatives, and member of the governing board, said: “I have a neighbour as well, whom already gave permission to put up an antenna as well. Line of sight to school.” One of his colleague echoed him by saying: “I also spoke to the elders in the mountain on where we can install the antenna.”

The meetings and encounters with the stakeholders became a skill transfer opportunity for everybody to learn how to install, orient the antennas, and set up channels to avoid interference from existing Wi-Fi. An initial presentation on mesh building was done during the introductory workshop, together with a discussion on its cost and maintenance. Every new installation became an active workshop.

The community representatives will expand the mesh network from existing radio sites. If they install mesh radios in areas where good coverage and good quality mesh links are ensured, they will quickly demonstrate the potentiality of the network to new community members, and new partnerships might develop.

4.5 Developing Local Services

Local servers have been installed in Ocean View and Masi to provide iNethi services. A portable iNethi server is also available for festivals and other community events. The

servers are running several open source services, including social networking (Diaspora), chat (RocketChat), file-sharing (OwnCloud), and web authoring (WikiFundi). Concerning these existing services, during the workshop several ideas emerged on their potential utility for the community.

RocketChat could be used to (i) report and provide crime alerts or general alerts about community events; (ii) create dedicated groups for safety and emergencies; (iii) share links to update journalists in the neighbouring communities with the latest information, in order to connect and update each other; and (iv) create groups for teachers to communicate.

OwnCloud can be used by community members to (i) upload activities that happen in the community, such as a cultural festival; (ii) upload DIY community services (i.e. tutorials on how to fix dripping taps and leaking taps); (iii) upload videos of news and events such as taxi strikes; and (iv) upload study materials.

Diaspora could be used as a platform for (i) advertisements; (ii) job opportunity hubs to offer and search vacancies in the area; and (iii) uploading of photos and links of current issues. Another local service is real-time voice communication, also already available and installed in the platform allowing the use of voice, chat and video sharing locally, among people registered on iNethi.

The Cloudlet platform will support new services designed for and by the community. The locally hosted applications and services will be co-designed, and eventually chosen by, the community. The community at large might also be encouraged to create local innovative services, inspire communities to create content for both local and global consumption, and the creation of Wiki content. The community owning the project will make decisions on the licensing of content, the availability of content at a local or global level, and the level of privacy attached to the content.

4.6 iNethi Philosophy

The phase of encounter, discussion, negotiation of rules and approaches, events and tests, supported the development of the iNethi philosophy: people taking control over the creation, construction, management and costs of a wireless network. The idea was generated contemporarily in the academia and NGO sector of Masi, as well as among a few activists in Ocean View. It concretised through the encounter between these stakeholders, which transformed the idea into a community project where technology is used as an amplifier of what people are doing and believing in.

The design and conceptualisation of the platform were elaborated on by some community leaders, supported by researchers who chose to collaborate to develop an initial phase to be shown and proposed to the community at large. The visualisation of the potential of the community network was considered essential, in order to present the idea, sponsor it among interested people, and gather support to expand the project. The conceptualisation of the network, nevertheless, implies the possibility for the community to refine the idea and become the driver and owner of the project.

The choice to give space to different types of expressions and ecologies, and the possibility “to develop an internet culture”, as expressed by one of the activists, are among the guiding principles of the participants. iNethi represents an opportunity to create a critical mass in the community and to develop internal creativity. Concerning

the decentralised content distribution, iNethi Cloudlets encourage content generation and local innovation for local content use, storage and sharing (through a credit process of the content, and localised/permissive licences based upon participants' decisions).

iNethi will not serve only the local needs for internal communication. The workshop highlighted the interest of the participants to also pre-populate the server with global content – such as free educational media. In this way, the goal to create a critical mass of community knowledge could be amplified, showing the potential to influence global information distribution through participation in the entire process of knowledge creation. With the increase of the critical mass of local content and knowledge, the network can work towards its inclusion in the global community. Over time, the services offered will expand and amplify the capabilities of the community to connect, co-produce, and share knowledge with external communities and eventually the web at large. The iNethi co-operative will coordinate the community-co-designed, -managed and -owned network.

5 Discussion

The activities described represent the initial phase of an ICTD project, from the formalisation of the idea among some representatives to the decision to structure the idea at different levels (the community network, the governing body and licenses, the infrastructures). Reflecting over the process, the involved people recognised a series of building blocks that allowed participants to get involved, and to the project to start and develop focusing on the community needs and desires, and create the conditions for community ownership and potential sustainability. The participation principles are highlighted with reference to literature on ICTD projects.

5.1 Building Relationships

An initial slow start is required in ICTD projects in order to familiarise the involved community and meet potential participants. Suchman [17] reminds us about the social relations that can be formed only over time. The phase of cognisance of the community represents the ethnographic phase of a study [18], where researchers are behaving mainly as observant participants and are evaluating the conditions of the community, the resources, and possible discussion points to start a collaboration. As Krauss [19] highlights, the community entry phase requires a series of steps to be taken over time, such as 'collaborative needs or situation analysis' and 'appropriate alignment with local leadership' [19, p. 25]. Attention to power relations and 'appropriate and culturally sensitive community engagement' are further issues to be considered when initiating collaboration in a cross-cultural setting, with developmental proposals (idem).

Acknowledging the limitations of results derived from a rapid ethnographic initial phase, Brereton and colleagues [20] suggest moving 'beyond ethnography' to strengthen the value of reciprocity and mutual learning between researchers and local participants. A collaborative environment based on shared knowledge and desire to mutually benefit, creates a foundation for the design novelty to fit into the local culture and for the participants to improve their practices.

In our project, the relationship developed slowly over several months. It is based on open dialogue, confrontation, and regular encounters organised both in the community and at the university. It was built over a long time, to (i) ensure the clarity of intentions of every participant; (ii) build trust among the local and external participants; (iii) evaluate the ethical issues; (iv) verify the potential of the collaboration, (v) involve more stakeholders; (vi) become inclusive; and (vii) build towards sustainability. From the researchers' side, there was availability to organise workshops, discuss new proposals, and evaluate the best solutions for the deployment of the technology. From the community representatives' side, there was the intention to involve more people, to support the mapping and analysis of the data collected, and to be the engine of the process by registering their organisation in order to achieve a common goal.

5.2 Engaging Community Stakeholders

Working within communities is not a straightforward task, and requires researchers and local participants to come together to accomplish a common goal. Such a process of engagement is often met with challenges which hinder the successful implementation of ICTD projects. The engagement process is one whereby roles, expectations and benefits of the research being undertaken need to be negotiated on a continuous basis [5, 21]. Project expectations and roles are prone to evolve, given the complex and changing environment in which ICTD projects find themselves. Therefore, continuous interaction with local participants is required to further ensure that learning (by allowing the project to adapt and be flexible to context) and inclusiveness, is occurring [5, 21]. This would then mean involving communities from the project's initiation stage and throughout its lifecycle [21, 22]. This includes all project planning, including sustainability and scalability concerns that arise.

Working with local participants throughout the project lifecycle further aids in uncovering joint benefits, which need to be clearly demonstrated to local participants to foster further engagement [5, 22]. Demonstrating the research benefits to local participants builds from a clear understanding of the context in which the desired engagement is being developed [22, 23]. The desire then is to become more people centred (rather than task oriented) and embedded within their way of life [24]. For example, allowing the community to be the ones to decide how best to engage is a means of being people centred [21]. Through that contextual understanding, researchers are in a better position to develop strategies for engagement, which Balestrini and colleagues [22] highlight as important; therefore, it should be clearly outlined what community outcome is being desired through the partnership being developed [23]. Moreover, demonstrating a clear understanding of the context further shows that researchers do value the community [22]. Stakeholders need to feel valued and recognise that they too have a role to play within a project. Excluding local participants or engaging them in a haphazard fashion only demonstrates a lack of trust; however, trust is important when building relationships, and needs to be built over time [21–23]. This necessitates a shift in mindset from the "us" (researchers) as all-knowing and "them" (the community) as lacking [24].

5.3 Ethics and Trust

'…As outsiders in complex social situations it is often difficult to identify the potential harms that might arise from our actions. This problem is compounded by the extreme imbalance in financial and social power of typical ICTD researchers and the people that they (we) work with' [25, p. 46]. Ethical guidelines, including universities' ethical clearance, consent forms, and signed agreements about the use of images and words of participants, are sometimes not 'enough' [26] to avoid harming the people involved in a research project. The risks associated with the balance of power between researchers and local participants cannot always be counterbalanced with the compliance with basic rules to protect vulnerable people. ICTD projects, in particular, deal with environments and conditions substantially different in economic, academic, social and political points of view, where there is often much heterogeneity present among the community members. In cases related to ICT, the researchers often deal, as well, with a quantity of data not received directly from the participants, but mediated by project technology [27].

The ethical standards expected of researchers and practitioners are nevertheless the foundation of a collaboration based on mutual respect. Ethical behaviours support, as well, the climate of trust that needs to be built into a project's roadmap, and cannot be taken for granted. In fact, over time, several projects experienced withdrawal of participants because of unethical behaviour and cultural insensitivity perceived by the people involved [28]. Sometimes, the collaboration is halted because of the discrepancy between expectations raised by the researchers and the limited practical results caused by insufficient funds or interest to develop a project. In those cases, the relationship is interrupted, and trust is at risk due to the breakdown of confidence.

In order to defuse that crisis and continue working towards the negotiation of community ownership, inclusion of the community members, and sustainability of the wireless network, relationships and trust are built incrementally. Relationships established over time in the communities of Ocean View and Masi, respected ethical research principles and guidelines. Further, research approaches were transparent, as were budgets for funds and resources. Establishment of roles and activities to be carried out over time were also important, to clarify the responsibilities and ethical attitudes expected from both sides – researchers and local participants.

5.4 Negotiating Ownership

Sustainability of any ICTD initiative, including community networks, depends on local ownership. According to Pade [29], the sense of local ownership has to be stimulated at the early stage of an ICTD initiative. For each project, the ownership is dynamic and highly dependent on the cultural, social and socio-economic context. Banda [30] suggests community engagement from the early stage of a telecentre project in Malawi, while external stakeholders need to withdraw slowly and empower communities to take the lead, as this will result in a sense of ownership.

Gram Marg Rural Broadband project at IIT Bombay, India has been working on a cost-effective technology solution with a sustainable business model for their community network, through field trials and test bed deployments [31]. They suggested a

community-owned network that will enable them to 'own the Internet'. This partnership enables the network to be community owned for effective decision-making, and to prioritise services based on village needs. Zenzeleni adopted a co-op model. The community in rural South Africa co-created the network together with researchers, and now owns its own telephone and Internet "company". A not-for-profit co-operative was formed, and successfully applied for a licence exemption to operate the network infrastructure and offer services. Revenue used to sustain the network can also be used for other community needs [32]. Rhizomatica [33] is a community network in rural Mexico, where communities have become both network owners and operators. Sustainability is ensured by combining regulatory reforms, community involvement, training, and maintenance of network equipment. Heimerl and colleagues [34] provide an analysis of locally owned cellular networks deployed using a bottom-up approach. They evaluated this model by building and deploying a for-profit community cellular network in rural Papua, Indonesia, in partnership with two local NGOs.

In the case of iNethi, the community opted for a co-op business model similar to the one of Zenzeleni. The involved members, to be as inclusive as possible, choose three interim committee members until the first annual general meeting of the newly created NPO gets an opportunity to elect its formal committee. One temporary member of the governing board, concerning the further steps to be taken, highlighted some suggestions showing its competency and readiness to move forward: "I recommend that once the NGO is approved, immediate application to issue certificates before any transaction takes place; it speeds up approval process".

6 Conclusions and Future Work Discussion

Qureshi, referring to several publications concerning research and practice, highlights how "few researchers engage in advancing policy positions or contributing to practice" [35, p. 512]. The dichotomy between research and practice continues being an issue of relevance when approaching ethical claims and disclosing the intentions of stakeholders participating in an ICTD project.

Building genuine community-based projects is not trivial. Efforts and engagements in research and practice activities require constructive collaboration. The relationship between research and practice is based on trust and ethical behaviour, as is the relationship between local and external participants. The ethical stance, based on justice and care principles brings benefits for communities – which will become project owners. Researchers benefit by intensifying collaboration with communities, mutual learning and knowledge sharing and creation.

The iNethi project is developing, and new ideas are constantly emerging because of the potential offered by providing a community-owned and -driven network following a participatory design approach.

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