

Towards self-sustaining community networks in rural areas of developing countries: Understanding local ownership

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Abstract

Community networks have been proven as a strong indicator for digital inclusion, which turns them into an attractive candidate if deployed in areas with scarce possibilities for communication and information, such as rural communities in the Global South. However, the lack of awareness and confidence prevents rural communities to embark themselves on their deployment, such that similar projects are usually initiated by external agencies. External intervention often incurs the creation of a rapport of dependency, and many such projects do not arrive to be long-lasting, sustainable, and community-controlled. The lack of local ownership has been often indicated as one principal factor for the failure of such externally-initiated initiatives. This paper tries to determine if it is possible to support the build-up of local ownership around a community network deployed through an external intervention. To this purpose, the paper introduces a case study of an externally-initiated community network project in rural South Africa. Based on the analysis of this case, the paper brings two contributions: First, it outlines an approach for operationalizing and studying ownership, based on an adaptation of a model from social psychology. This comes as an important contribution, since despite great interest in studying ownership, there are no established rigorous approaches to measuring it in community and development informatics. Second, the paper offers an analysis of the forms that ownership takes, and how ownership relates with other determinants of successful project management, such as the exercise of power, responsibility and commitment, applied to the South African case reported.

Keywords

Community networks, local ownership, rural communities, South Africa

Introduction

Community networks are large-scale, self-organized and decentralized networks, built and operated by citizens for citizens (Braem et al., 2013). Their participatory model carries the potential to become an inclusive and effective solution in bootstrapping digital infrastructures in challenging environments, where a market for commercial Internet Service Providers is not developed or where some people may be excluded by a competitive or market-driven model (Dimogerontakis et al. 2014), as demonstrated by some cases (e.g. Oliver et al. 2012). However, most of the community networks reported in the literature are located in developed countries. In rural areas of developing countries, where the opportunities for digital inclusion offered by community networks could reach their full potential, there are very few instances of successful deployments, and close to none of bottom-up deployments. In almost all cases reported, networks are initiated by someone external to the community. External intervention often incurs the creation of a rapport of dependency, and many such projects do not arrive to be long-lasting, sustainable, and community-controlled. The lack of local ownership has been often indicated as one principal factor for the failure of such externally-initiated initiatives. For example, in a case in rural South Africa, although the community network was proven to be technically feasible, ownership could not be successfully transferred locally and eventually the network ceased to operate (Johnson et al., 2008). In cases where local communities take real ownership of the network, positive outcomes are reported (Galperin et al., 2007). This encouraged an approach to designing externally-initiated community networks that considered aspects of ownership transfer from the early stages of an initiative (e.g. the deployment of a community network in rural Cambodia reported in Dara et al. 2008).

The study of 'ownership' as one of the critical factors for projects sustainability is corroborated by several development informatics studies (e.g. Ballantyne, 2003; Weeks et al., 2002). Despite wide interest in understanding and evaluating it, 'local ownership' is considered nonetheless an elusive and broad concept, difficult to operationalize and assess (Johnson and Wasty, 1993). This paper intends to calm this gap by proposing an approach for operationalizing and analysing 'ownership', and its application on a concrete case of ownership transfer. The main questions we pose are: *Is it possible to support the build-up of local ownership around a community network deployed through an external intervention? If yes, what forms can local ownership take, and how are these forms influenced by contextual factors?* To answer these questions, the paper introduces the case of an externally-initiated community network in rural South Africa, designed from the beginning with a view to sustaining the build-up of local ownership. This case is analysed, and on this basis arguments are brought that local stakeholders have developed a sense of ownership of the community network that is fashioned by local values and norms. Local people have built localized structures for project coordination and management, characterized by a strong attention to the collectivity and representative forms of decision-making. The implications of these findings for the scholarship on ownership in development informatics, and particularly community networks, are discussed.

Background and context

Defining ownership

Local ownership is discussed in several ICT4D and community informatics studies as one of the critical factors for projects sustainability (e.g. Ballantyne, 2003; Weeks et al., 2002). Definitions of ownership tend to focus on one or more of the following constructs: responsibility, control, and command or effective action. For example, ownership has been defined as:

- “processes where local stakeholders take *control and responsibility* for the design, implementation, and monitoring of an activity.” (Ballantyne, 2003)
- “the acceptance of *responsibility* through the process of stakeholder participation, empowerment and consensus.” (Singh, 2002)
- “the exercise of *control and command* over development activities. A country or an organisation within a country can be said to ‘own’ its development program when it is *committed* to it and able to translate its commitment into *effective action*.” (Molund 2001: 2)
- “the *control* over a project or program and *commitment* to its success.” (Weeks et al., 2002) (authors’ emphasis)

Most authors agree that ‘local ownership’ is a crucial, yet difficult to operationalize, even fuzzy concept, which makes rigorous assessment difficult (Khan & Sharma, 2001:13; Johnson and Wasty 1993:2). Rather than focusing on developing rigorous assessment models and approaches, the development literature dealing with ownership tends to focus on the *factors* or processes that build up to it, among which the most widely mentioned are: local participation from early project phases; project relevance to beneficiaries’ needs; capacity building; and effective stakeholders management.

The Mankosi community network

Mankosi is a traditional rural community in the Eastern Cape Province of South Africa. The Mankosi community network commenced in April 2012. The project started with a needs assessment and resulted in the deployment in June 2012 of a community network to address the high costs incurred for communications (Rey-Moreno et al., 2013). Mankosi comprises 580 households in twelve villages that are spread across 30km² of very hilly land. Families of up to five adults and seven children live in homesteads: clusters of thatched, mud-brick rondavels, an occasional tin-roofed 2-room dwelling, an animal corral and a garden for subsistence crops. Households survive on 60 to 150 USD per month, from government grants and payments from family members who temporarily migrate for work. Like 36% of South Africa’s population, inhabitants are governed by a Tribal Authority, which in Mankosi consists of the Headman, 12 Subheadmen and messengers. The Headman and Subheadmen’s homesteads are sites for local administration (Bidwell et al., 2013). Access to electricity in the community is quite scarce, and where available the service suffers from frequent and prolonged blackouts.

After conversations with local authorities in 2012, training and support was provided by the University of the Western Cape (UWC) for the installation of a community network allowing voice services over 30 km². So far, it is allowing free calls among the 11 points of presence in the community. In these points, analogue phones have been installed to also allow non-mobile phone owners the opportunity to communicate. According to a needs assessment

carried out in April 2012 a faster and higher uptake of the local service was expected (Rey-Moreno et al., 2012). However, data collected in June 2013 showed very limited use. This is partially due to the fact that the Tribal Authority did not share with the population the public access nature of the service. This situation was assessed and following local procedures, the topic was covered in a general community meeting, and subsequent village meetings were held in July and August 2013 to inform the population. The meetings provided the opportunity to realize that the local call use envisioned was going to be more sporadic than expected due to the inability to call mobile phones.

Since calling mobile phones was technically feasible, a socio-economic plan was devised to cover the costs. Based on the experience from (Bidwell et al., 2013) the initial design of the wireless station's power supply included two cigarette lighter sockets to allow users to generate revenue from charging phones to help make the communications network sustainable. Since June 2013, more than 800 USD, with a consistent monthly contribution from all station holders, has been collected collectively. The money served to finance the Internet connection required to call mobile phones from the stations installed and cover the maintenance costs (Rey-Moreno et al., 2013). In parallel, in order to provide these services legally, a local cooperative was registered, which has obtained permission from ICASA to act as an Internet Service Provider (ISP).

The local cooperative is composed so far by a representative of each of the households hosting an analogue phone, some of them Tribal Authority members. Its members have been given the mandate by the community to operate the network for the community's benefit. This entails that all the surplus from the service provision will be reinvested for development projects initiated locally, an aspect mentioned in the cooperative constitutional objectives. The board of members of the cooperative is responsible for deciding the cost for charging mobile phones and making break out calls, for collecting the revenue, and deciding how to spend it. In exchange, the board of members benefit by charging phones for free and having two LED lights installed on their own expenses, something that was authorized by the community in the meetings described above.

Research design

The study reported herein has been designed purposefully to assess the build-up of local ownership in the Mankosi community network. This section outlines the conceptual model that guided the analysis and the methods used for data generation and analysis.

Conceptual model

This study is guided by a conceptual model (Fig. 1) based on an adaptation and interpretation of the model of psychological ownership (Pierce et al., 2003, 2009; Van Dyne & Pierce, 2004) and its extension in Avey et al. (2009). In the same stance, we treat ownership as a psychological construct (a state inclusive of cognition and affect), multidimensional, evolving and dynamic.

The analytical model bears five categories, explained below with reference to the Mankosi community network:

1. *Behavioural determinants of ownership.*

The category covers patterns of activities conducted for the development, maintenance and use of the network that can be related to the build-up of a sense of ownership. The patterns of involvement have been operationalized in relation to the agent's degree of autonomy (autonomous individual, autonomous in group, assisted by UWC researchers, under the direction of UWC researchers) for specific project tasks.

2. *Mechanisms or direct routes to ownership.*

This category covers the most important mechanisms for cultivating ownership, which can be treated as direct predictors or indicators of ownership of the entire initiative or parts thereof. Three mechanisms have been identified:

- *Power and control* refers to the perceived or actual control an agent has over directing the course of events by direct or indirect action and decision-making.
- *Knowledge* captures degrees of knowing about the project (e.g. its goal, milestones, etc.) and operational knowledge or skills covering certain areas vital for the advancement of the project (e.g. being able to assist maintenance of solar power and energy storage solution).
- *Self-investment* is treated as a subjective perception of and attitude towards the outcomes or fruits of one's involvement in the project.

3. *Relational dynamics (relation target-agent).*

This category captures the pattern of relatedness between the agent and the target, answering the question: what role, function, or need does the target (the network) fulfil or help to fulfil, for the agent? Three components are identified:

- *Perceived usefulness*: the degree to which the network is perceived to meet collective and/or individual needs and goals of local stakeholders (e.g. helping people save on calls)
- *Self-efficacy*: the degree to which the agent perceives s/he is able to perform effectively to achieve set goals in relation to or through the mediation of the target.
- *Self-identity*: the degree to which the agent uses the initiative or a component thereof (e.g. one's role, one's achievements) to define himself/herself or express her/his identity to others (e.g. "When I meet new people, I describe myself as a local researcher for the Mankosi community network") and the associated feelings (e.g. "I am proud of being a local researcher").

4. *Sense of ownership.* This is the core of the model, and captures the degree to which the network is perceived as one's own, individually and/or collectively. It is important to state that the components within the categories *Mechanisms* and *Outcomes of ownership* can be treated as strong predictors or indicators of a sense of ownership (for instance, a high degree of ownership is likely to couple with a high degree of *control* and high assumed *responsibility*). While other ICT4D models choose to treat these elements as dimensions of ownership (e.g. ownership as responsibility and control), in here we choose to emphasize the relations of determination among these elements, without denying however that they can be used as indicators of ownership. To mark this distinction, the model designates a *core* and an *expanded sense of ownership*.

5. *Outcomes or effects of ownership.* These are attitudes, states and behaviours developed as a consequence of building a sense of ownership. We focus here on two such constructs, though there can be many others identified.

- *Responsibility and stewardship.* *Responsibility* refers to the degree to which an agent feels responsible and accountable for the network and/or for outcomes of one's own

work. *Stewardship* refers to the care and custodianship of resources on behalf of someone. It may equally capture attitudes and behaviours of care and protection over the network, directly or indirectly (e.g. making sure all measures are taken against risks of technical disruptions or thefts; intervening in case of attempted theft).

- *Commitment* covers the attachment for the initiative and the rationale for maintaining one's involvement in the project (answering the question 'Should I maintain my membership in this organization and why?', Van Dyne & Pierce, 2004).

Finally, *contextual factors* (Pierce et al., 2003) group those determinants that are likely to have an impact upon the project and people's relating to the project. Factors can be *structural*, such as the legislative infrastructure (e.g. physical barriers to participation in project activities due to distance; low formalization of property rights), and *socio-cultural*, such as moors, customs, socialization practices and traditions (e.g. culturally validated hierarchical decision-making patterns; socially constructed collective types of ownership).

Methodology

Data generation

The study used data gathered in the period April 2012 – June 2014 through ethnographic observations, project records from the community assessment phase, project progress reports, meetings recordings, and interviews with local stakeholders. Ethnographic observations were carried out by the lead field researcher from UWC, who has been living for more than 16 months in Mankosi. Observations served to contextualise the study and provide first-hand data regarding the gradual evolution of the network and its appropriation in the community.

The interviews have been designed purposefully to measure the degree of local ownership manifested by local stakeholders. The interview guide was developed following closely the theoretical model outlined above, and included questions for each of the major areas in the model: behavioural determinants of ownership, mechanisms, relational dynamics, sense of ownership, and outcomes or effects of ownership. The questions have been developed specifically for this study (e.g. inquiring about specific tasks or network usage) or drawing on published studies and scales adapted for the purpose of the present study (e.g. for measuring perceived control, self-efficacy, sense of ownership, self-identity and commitment).

The sampling strategy was guided by the aim to ensure a representative coverage of local stakeholders directly involved in the project, including in particular members of the Tribal Authority, hosts of access points, members of the cooperative board, and local researchers. Ten interviews were conducted in the period April - June 2014 with local people selected on this basis. The number of interviews is considered representative for the local stakeholders involved in the network, since many respondents covered different roles (e.g. local researcher and host of access point; member of the Tribal Authority and cooperative board member).

Data analysis

Coding and analysis of the qualitative data resulting from interviews focused on measuring ownership was performed following a hybrid method of inductive (data-driven) and deductive (theory-driven) thematic analysis (adapted from Fereday and Muir-Cochrane,

2006). Using this method, the coding process started with the identification of a set of a priori categories elicited from the theoretical model. Data-driven coding was then performed on four interviews, and codes were associated with a priori categories, or led to the formulation of novel categories. A library of codes and categories was then developed including both a priori and data-driven ones, which were applied on the rest of the interviews. In the final stage, codes were clustered and portions of text cross-analysed to identify themes, which were organized into an analytical framework that captured and made sense of the data.

Findings

In this section we report on part of the findings, focusing on understanding to what extent ownership has been developed by community members directly involved in the project, what forms ownership takes, and the relations established, on the one side between ownership and its mechanisms (especially knowledge and the exercise of power or control), and on the other between ownership and its outcomes (responsibility and commitment). The findings are organized around five areas, for which one or more themes are outlined and explained.

Dimensions of ownership

A sense of collective ownership prevails over manifestations of personal ownership of the community network.

The strongest emerging theme is the development of a strong sense of collective ownership, prevailing over that of personal ownership. All the people interviewed acknowledged that the network belonged to the people of Mankosi. This form of ownership was described in all accounts, irrespective of the role in the community or in the project that the interviewee held. For example, a young local researcher commented: *“It has been handed clearly to the community to decide, to make plans”*, while a member of the Tribal Authority commented: *“I can’t call it mine, it’s been given to the community, the people.”*

Most interviewees acknowledged that the project belonged to the community at present, despite the fact that UWC researchers were still involved in its management and provided technical support, and that the knowledge transfer was not yet completed. A member of the Tribal Authority commented: *“It is ours, we are deciding for it, we own it now.”* Yet some others, fewer, deemed that ownership would only be fully theirs when the community would be left to manage the network autonomously. This point is further analysed in Section 4.3.

Personal ownership is restricted to limited areas of the project or tasks, and never acknowledged as covering the entire project.

Some respondents acknowledged a specific sphere of the project as their own, corresponding to tasks or areas where they have had an important role and developed sufficient knowledge and skills to be able to handle it on their own. Examples are maintenance, charging phones, and collecting money. People could refer to these areas as “their own” as they could decide over these matters without having to consult the others, and were able to manage them autonomously. For example, a local researcher

with technical skills, in charge of maintenance, mentioned: *“(F)or a task like maintenance it is more my work, and I decide when I go to fix. It is more up to me. But some decisions that are made in the meetings, for example with the dates that they chose (...) I can’t tell them when to go.”* These respondents referred back to collective ownership when tasks fell outside those they could manage alone, and which required consultation or joint work.

Collective ownership and its mechanisms

Despite the acknowledgement of a sense of collective ownership, the exercise of power is entrusted to a team of local people.

Although it seems to be a general consensus about the collective ownership of the Mankosi community network, its management and control have been entrusted to a team of people: those hosting the stations. These people were not voluntarily committed, but selected by the Tribal Authority, and validated by the community in a meeting where 150 members were present. As a former member of the Tribal Authority puts it: *“They have been given the responsibility to look after these systems, and their profit. We, as the community, as Mankosi, we have said “look after this”, but if we are not satisfied with the way that they control it, we are going to take it to someone else”.* This is acknowledged by a board member and host of an access point: *“It’s the people’s and Mankosi’s, we just do the work”.* These team members are the ones that registered Zenzeleni Networks Ltd., the legal structure that is taking the executive decisions in the project. Since May 2013, its board members meet *“near the end of the month”*, or when issues arise they *“set a special date to deal with it”*. Whereas there was a period where some of them failed to attend, participation in the last months is on average 8 of the 10 people, specially because it is becoming more common to send delegates when they are unable to attend, as one of them explains: *“In the last meeting I sent my son to go to the meeting because I couldn’t attend”.*

Recognition of local leadership and the exercise of power on terms compatible with collective ownership is done for selected members on the basis of: status and education, knowledge and skills, as well as acknowledged personal contribution to the project and participation in decision-making.

There was wide agreement among the team members about the recognition of three of them as key for the development of the project due to their contribution and participation in the decision-making. A board member and host of access points expresses it with regards to their participation: *“X, Y, and Z (...) are able to think clearly, have ideas and make means to resolve problems”*, and another one refers to their contribution: *“The project can’t proceed well without X, N, Y and Z, They are active and always bring a lot of money in the meeting”*. This is also acknowledged by people external to the team, as a Tribal Authority member explains *“When X and Y are not around things do not progress properly, others don’t always participate or ask things in the meetings, they always agree with what other people say”*.

However, every one recognizes one single person as the one with the highest power within the board, as one board member and host of an access point summarizes: *“Z knows most things and gives us direction, Z can fix things, and when we have problems we tell Z”*. Or,

as a former member of the Tribal Authority summarizes “Z is the life giver in this project.” Z’s investment with a crucial role in the project is a measure of personal qualities, role in the project, education level, previous experience with technology-oriented projects (Bidwell et al., 2013), as well as knowledge developed for project matters. Apart from being one of the few educated members in the community, Z has acted as a mediator and entrance point for the external researchers, in which capacity he was best positioned to learn about technical and managerial areas of the project. Although he is aware of his power: “I have a lot of power to influence if I wanted my things to go on my own way”, he reinforces the collective ownership with his actions “I usually open up some options but I don’t think I take the final decision.”

Collective ownership, knowledge and capacity-building

The impetus for knowledge and capacity building are in a relation of mutual determination with the development of a sense of ownership.

It was found that the more people acknowledged a sense of ownership, the more they acknowledged the need to learn, build capacity, so that they could manage the project on their own, and viceversa. Their sense of ownership did not make them blind to the many aspects of the project that were still obscure to them, and the reliance on UWC expertise. Therefore, while they felt the network belonged to them, they also realized that for full ownership to be developed, capacity-building needed to be completed, or in the words of a former Tribal Authority member: “It is not ours 100% yet, as we are still working with UWC and we are still getting information from them”. Most of the people interviewed, and especially those that were part of the board, proved to be aware of these aspects and eager to learn more, as one board member and host of an access point expressed: “I would like that when the UWC team leaves we will be at the level where we know everything”. However, some acknowledged that capacity building might never be completed to a level that can enable them to run it autonomously.

Ownership, responsibility and commitment

Collective ownership engendered different forms of responsibility, the first related to direct stewardship and the second to collective support.

Two forms of responsibility emerged from the analysis, both of which could be assumed by individual stakeholders, or delegated by respondents to other members of the community. The first was related to the exercise of power on behalf of the entire community, a form of responsibility that can be equated with the concept of ‘stewardship’, the management of the resources entrusted to the care of someone. The members entrusted with responsibility would acquiesce that the benefits continued to be reaped by the entire community. With respect to stakeholders, most respondents entrusted responsibility with the entire board, or selected members of the board. These selected members corresponded in general to the people who exercised power and control as discussed in the themes under 4.2. Several reasons were mentioned for this choice: having valid opinions, steady attendance and contribution to meetings, demonstrated love and devotion to the project, thinking clearly, having ideas, demonstrated ability to solve problems, fix things, and give guidance and direction. Some respondents insisted that the people in charge should be the ones with better education, who could absorb the knowledge and skills imparted by the external team of researchers. For example a host of access point

and board member comments: *"We trust people who are having education because they are the ones who can see things differently. I would turn the responsibility to Z, because he is the one from the team who is much better in terms of education"*. This viewpoint is shared by a former member of the Tribal Authority: *"We should consider giving opportunities to our young educated kids who will have the relevant skills, not us elders."*

This responsibility is already being given to their children when are asked to represent board members in the board meetings. A responsibility which is expected to grow with time: *"I am looking at those children that are now at school, I'm looking at them to come at some point and help the project to go further"* (Host of access point and board member). The second form of responsibility was a rather indirect form of stewardship, and can be equated with collective support, nurture and protection. This form of responsibility was found to be closely related to the idea of collective ownership: since the entire community owned the network, they were equally held responsible to protect it, care for it, and ensure that no harm was being done to components crucial to its functioning. For example, one local woman, host of an access point and board member, commented: *"I believe that as people of Mankosi we should work together and maintain the existing project for the future. If that (failure) can happen, for me it will mean that we have failed to work together to develop our community."*

Developing a sense of ownership is positively correlated with engagement and commitment.

The project did not generate a high level of commitment in its early months. People could be found to forget about meetings, intervene little, shy away from assuming responsibility. Yet, two years after its inception, much higher levels of engagement and commitment could be noticed. The lead local researcher, board member and host of an access point noticed how in time members of the board became more proactive, had more initiative during the meetings, and became more reliable: *"I think that now that everyone is committed to the project at this stage, everyone wants to use it for a good thing. Because there are plans, like with the school, the maintenance (that they will pay for it), the bank account... The plans are there to use the money for every effective stuff."* The levels of commitment manifested by people interviewed were very high. A few quotes can give a sense of these levels:

- *"I have hope that this project will never end, that it will exist in this community forever. And that I am part of it forever, and that it becomes a legacy for later generations."* (Tribal Authority member)
- *"I would be here till I'm old and have to retire because of old age illnesses."* (Male board member and host of an access point)
- *"I'd be involved until the end, I don't really have a reason, we don't really get any financial compensation."* (Female board member and host of an access point)
- *"I like how the project is made, to put the community together and I have been through it from the beginning so it is like a son that is growing on me."* (Local researcher, board member and host of an access point)

These high levels of commitment can be traced to a combination of two factors: First, the internalization of a sense of ownership, the perception that the network belongs to the

people of Mankosi. Second, the fact that the project delivered on its promises, realized the goals it had set for itself, and some local people were directly involved in making it a success.

For instance, a Tribal Authority member commented: *“I am proud because we work well together, as a community we need to work to uplift the community. If we do that there are many things that the community can achieve.”*

Contextual determinants: local forms of organization, values, and norms

Local forms of organization, values and norms influenced the way the project was received, and also determined localized management forms, and accountability mechanisms.

The reception of the project, as well as the way it was organized and managed locally were influenced by structural factors as well as by socio-cultural values and norms. With respect to structural factors, the most important to mention is the political form of organization having a headman and a Tribal Authority as the leading authority. It was this authority that named the board entrusted with the local coordination of the project, which ensured that nominations were accepted and endorsed by the entire community.

With respect to socio-cultural factors, the project reception was influenced by local values, as well as norms and unwritten rules. Local values such as honesty, trust, respect and delivering on one's promises were found to be important determinants in the acceptance and appropriation of the network. One important aspect that encouraged local appropriation is the fact that the project delivered on its promises. This strengthened feelings of trust towards the external researchers, and also made local people directly involved feel proud about having attained goals they had set, through their own efforts: *“I'm filled with great pride, and have great hopes for its future success (...) I am confident because most goals we set have been achieved.”* (Board member, former Tribal Authority member and host of an access point).

Another strong value of the Mankosi community is its collective ethos. People are used to work together to collectively sustain their livelihoods. In this context, the project has given them the opportunity to realize that they can work together to create something new, something better. The project offered an occasion and goals around which people could unite and mobilize themselves to imagine and work towards creating a better future, to the extent that people's hopes for the future were partially embodied in the project.

“The most important thing that I have learnt is that I didn't know that you could still get a little bit of money without having to go outside of the community to work hard. Just slowly, talking to people to set up the rules, getting a bit of money, starting a business that can help people in the future locally. So that's a very big skill to me, as I didn't know that we could start from a small thing and grow up.” (Board member and host of an access point)

The strong collective ethos drove as well the creation of local forms of accountability, shared decision-making and mechanisms for keeping the community informed about the project progress. Local actors with decision-making power felt they could act only after

consultation: *“(W)hat always concerns me, whenever I’m going to do something on the project is if I do it without consulting them. Because if I do too many things on my own, this is when they are going to think that I am the one leading it.”* (Lead local researcher, board member and host of an access point). Members of the board also felt accountable towards the larger community, to the extent that they considered the project’s failure a form of failure to deliver upon the expectations of the larger community: *“It would be an embarrassment if we fail. No, we cannot allow that. People would talk, talk, talk, we cannot allow that.”* (Board member, Tribal Authority member and host of an access point).

At the same time, the network reception and forms of local organization were influenced by local norms. Gender issues can be mentioned, in this respect. As one local researcher commented, *“How often do you see women contributing in the meetings? They are not contributing that much, and it is because the females are not really used to stand in front of the man and say their opinions.”*. Age issues were mentioned as well. Younger age is not only acknowledged to imply a better education as discussed in Section 4.4, but also better familiarity to the use of technology. For example, an elderly member of the board says: *“(T)hey (children) are more knowledgeable about these things”*. While the lead local researcher corroborates this view, he acknowledges as well a counterpart generational gap: *“In the approach to old school people, you need to be slow and follow their way of talking. No matter how in a hurry I am, I have to be more slow. That’s unusual for us as young ones.”*

Discussion and conclusion

This paper introduced a model for operationalizing and analysing the build-up of local ownership in externally-initiated development informatics projects. The model, borrowed from the social psychology literature, was adapted to understand the forms of ownership that can be developed by different stakeholders involved in a development informatics project, as well as highlight the subtleties in the process of formation or transfer of ownership. The model has been applied to a South African case, to understand if and to what extent ownership of a community network was successfully transferred to local people. In this section, we emphasize two aspects that emerged strongly from the analysis, and which promise to advance the existing scholarship around the transfer and build-up of ownership in development informatics projects: the delimitation of the concept of ‘ownership’, and the localization of ownership in concrete cases.

1. Core and expanded sense of ownership

A review of current development informatics studies of ownership against the model used in this study (Fig. 1) reveals that operational definitions of ownership tend to use as indicators of ownership both mechanisms, such as control, as well as outcomes, such as responsibility (e.g. Ballantyne, 2003). One of the merits of the model and the approach proposed in this study resides in clarifying the limits of the concept, as well as the subtle relations established with core determinants and outcomes of ownership. The analysis confirmed that there is a positive correlation between ownership and elements such as control and responsibility. Most importantly, it confirmed that the sense of ownership is as well *distinct* from these. This distinction made it possible, for example, for all stakeholders to manifest a *collective* sense of ownership, even in cases when they exercised *personal* decision-making power. In the same vein, it was possible to see that some respondents

manifested a strong sense of ownership, without exercising power, or could delegate the responsibility to other members of the community. These examples point to clear distinctions between the sense of ownership and constructs such as *responsibility*, *power*, and *control*. At the same time, data showed strong relations of interdependence between ownership and its mechanisms (in particular knowledge and power/control) and between ownership and its outcomes (responsibility and commitment). Given these strong relations, we acknowledge that both the mechanisms and the outcomes of ownership can be used as indicators of ownership (e.g. a stakeholder that proves a high sense of commitment can be supposed to have developed a high sense of ownership). Nonetheless, we propose that a distinction between these elements should be maintained in rigorous analysis. Based on these results, we propose that it is sensible to distinguish between a core and an expanded sense of ownership, as outlined in Fig. 1. One of the limits of this study is that while positive correlations have been identified, the study was too small to prove the existence of causal relations between the constructs. Future research in development studies and development informatics can shed better light on the correlations between these constructs, and to what extent causal relations between ownership, its mechanisms and its outcomes can be hypothesised.

2. Localization of ownership

One of the key themes emerging from the analysis was that all stakeholders involved in the study had developed a sense of ownership that reinforced the idea of collective possession: no one assumed or assigned personal possession of the network, rather the network belonged to the entire community. This form of ownership had a counterpart into the development of local structures for managing the network that were chosen by the Tribal Authority and validated by the community. One hypothesis we have put forward in the analysis is that the predominance of collective ownership is likely to be rooted in the strong collective ethos detected in the community during the study. Additionally, the project seemed to resonate with local values such as respect, honesty and trust, and could seamlessly be emulated on local socio-political structures. It appears, therefore, that there was a localization of ownership through local structures, values and norms pre-existing the project. These structures and norms made easier the use and operation of collective infrastructures like a community network, as they already provided an unwritten basis for its “license”. A license in a community network is an agreement among the members that defines the way of using and operating the network, and has proven to be a key factor of success in guifi.net, the biggest community network in the world (Oliver et al., 2012).

Another aspect that emerged was that the project resonated with, but also functioned as an amplifier for the manifestation of local values such as honesty, trust and respect. These aspects point that the participatory nature of this particular type of networks might have served to reinforce the existing social capital, as it has been proven in other studies (Abdelaal & Ali, 2012). Likewise, the project can be supposed to have gained better acceptance because its values and approach resonated with local ways of being and thinking.

Based on these considerations, we propose that future research on local ownership could engage with better understanding how local structures, values, customs and norms can shape contextualised forms of ownership. Another aspect of interest, and part of our future research plans on the same case, is a better understanding of the factors that influence

the build-up of local ownership, and the bearing of contextual factors against elements of the project design and approach.

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