Moving away from Erindi-roukambe: Transferability of a rural community-based co-design

Heike Winschiers-Theophilus[1], Naska Winschiers-Goagoses[2], Kasper Rodil[3], Edwin Blake[4] , Tariq Zaman[5], Gereon Koch Kapuire[1] and Richard Kamukuenjandje[1]

[1]Polytechnic of Namibia (heikew, gkapuire, rkamukuenjandje@polytechnic.edu.na), [2]Universität Hamburg (naska.winschiers@uni-hamburg.de), [3]Alborg University, Department of Architecture, Design and Media Technology (kr@create.aau.dk), [4]University of Cape Town (edwin@cs.uct.ac.za), [5] University Malaysia Sarawak (zamantariq@gmail.com)

Abstract:

It has become increasingly clear that situated design and contextualized research needs to undergo a validation phase to determine transferability. Within our longitudinal research project in rural Namibia, we have reached a maturity of methods and product. Yet little do we know about their validity beyond the limited context in the absence of cross-contextual verification. In Erindi-roukambe, the site of our community-based co-design, we have learned to understand and include local perspectives and structures within the dialogic of a participatory action research approach. By engaging with the community over a long period of time local research findings, as well as mutual knowledge have fostered and enriched design decisions. Recognizing that indigenous rural communities in the regional and globally face similar challenges with inappropriate mainstream technology we are currently investigating the applicability of our findings, processes and prototype in other contexts. We have introduced our approach at three other rural sites, two in Namibia and one in East Malaysia. The communities responded well to the technology demonstrating intuitive use and engagement. However, although we have gained promising results we wish to caution pre-mature conclusions on transferability without a more profound understanding of the depth of community engagement, transformation, contextual similarities, and cross-contextual validation.

Keywords: community-based co-design, transferability, development, validation

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1. INTRODUCTION

For many years practices of information technology transfer were based on a premise of universal validity of products, concepts, and even methods. The ICT4D community has meanwhile recognized the significance of differences in development and usage context. Shortcomings of user-centered methods, evaluations, or benchmarks in developing regions (Marsden, 2008), have led to a more thorough look at the relationships between cultural contexts and meaning in design. Irani et al. (2010) uses postcolonial computing as a framework to conceptualize design in terms of engagement, articulation and translation with an attempt to embrace heterogeneity rather than standardization. Harrison et al. (2007) applied the term "situated-paradigm" to perspectives that respond to the social context of interactions and the varied non-technological factors that affect design and use. Situated approaches, such as, value-sensitive and participatory design, action research, and living labs treat interactions of all types as a form of meaning-making in which activities, artifacts, and their context—at all levels—are mutually defining and thereby endorse locally meaningful design.

Over time the ICT4D and HCI4D community of practice has acquired a large pool of case studies, lessons learned, do's and don'ts, as well as direct and indirect implications for design. However how to extract valid and generalizable research findings from design cases has been a challenge. We believe that a main criticism of the living-labs approach to research is precisely that it avoids this issue of transferability to new contexts. Living labs have become accreted with several layers of meaning, a central idea was deep community involvement, over that was added notions of open innovation and community-based entrepreneurship (Schaffers, Guerrero Cordoba, Hongisto, Kallai, Merz, & van Rensburg, 2007). By engaging deeply with the community over a long period of time local research findings, as well as mutual knowledge and trust foster and enrich local design decisions. However the focus on a single community is precisely the threat to generalisability in research that we are pointing to. The question that arises is whether the results are narrowly bound to the context in which they originated or whether our work can succeed when we move away from our first user community to another community. That long-term design and technology exposure could create rural users with characteristics not representative within their own demographic. Or, that results are highly colored from researcher sensitivity acquired over time to a specific context. In evaluating the success or the efficacy of this move we are also aware that there are no universally valid *a priori* measures for establishing this.

Furthermore as researchers and authors our first task is to describe the primary context in which the design was undertaken and the 'other' context it was transferred to. Yet already here we face major challenges. The underlying intention is to set the scene for the corresponding message of the paper, which directly influences which aspects we choose to share with the reader. As we are exploring the transferability of our design and processes to communities 'elsewhere' (Suchman, 2002) or 'out there' (Taylor, 2011) we realize the partiality of the perspective and consequently the possible misrepresentation of the context. Demonstrating the transferability of our design across contexts, we choose to expose the 'differences', while arguing for wide applicability we emphasize the 'similarities', such as for example elders worldwide having a weaker eye sight. Thus we have to recognize that any attempt to describe a context 'out there', what is different and what is similar is framed through our own lenses.

In this paper, we first briefly introduce our long term community-based co-design in Namibia. We

then explore its transferability to three rural communities, two in Namibia, seemingly similar and one in East Malaysia, seemingly different. In an attempt to provide the reader with 'comparable' information we will provide a limited description of each site's entry point, homestead architecture, community and communicative structure as well as computer and visual representation skills. We consider these facets to be directly relevant to the prototype and the methods deployed. Following observations on the usability and appropriation at the sites we discuss issues at the core of cross-contextual transferability, such as the depth of community engagement, transformation, contextual similarities, and cross-contextual validation.

2. COMMUNITY-BASED CO-DESIGN IN ERINDI-ROUKAMBE

2.1. Background

A number of Namibian rural communities often consist only of elders and toddlers during extended times of the year. Children of rural parents commute with varying frequency depending on age and school location, but return to the village during school holidays. Furthermore, a majority of young adults have migrated to urban areas either for education or job opportunities. Thus the traditional oral and performance means of conveying locally valuable knowledge, from one generation to another, is interrupted. These urban migration patterns however are temporal and impermanent in Namibia, as migrants keep on investing in their traditional rural area (Niikondo, 2010). Most young adults, who moved to cities, maintain a close relation with their rural community, frequent visits, participation in rural activities, such as harvesting and husbandry. These temporary migrants need to possess a dual set of knowledge and skills, in order to function in both contexts. The skills required in the village are significantly comprised of indigenous knowledge and intangible cultural heritage promoting a sustainable life. Traditional and current Namibian social structures are based on an intrinsic deep respect for Ancestors and Elders, considered to be most knowledgeable.

2.2. Design principles and interactions

In 2008 we constituted an interdisciplinary research project with the aim of developing an intuitive and suitable digital indigenous knowledge management platform, where rural elders collect and curate their knowledge to later facilitate the young migrants' acquisition of knowledge. We are particularly concerned with designing from an indigenous perspective, embedding practiced local values, based on principles of Ubuntu, considering the interconnectedness between people and an overall holistic view. This local way of life and conceptualization of the world determines our design processes and decisions, in which our associations as designers are continuously re-defined and where at times we find ourselves "being participated" rather than facilitating design activities (Winschiers-Theophilus et al., 2012).

Thus over the last three years we have established profound collaborative rapports with rural African community members in Erindi-roukambe. We have consistently and continuously worked with four male elders, as well as with a number of community members, depending on their ability and willingness to participate. The community is the home of one of our academic colleagues, whom we refer to as the host-researcher, to acknowledge his rootedness in the rural community, his membership of the academic team and as the main facilitator of interactions in the community. Through intense debates, dialogue, multiple focused studies, cooking, bush walks, story sharing, design and evaluation sessions, laughing, documenting, and reflecting, we have grown closer with the community. The desire of mutual learning has been at the centre of all interactions and has been continuously expressed and reconfirmed by all parties involved. We have experienced the unexpected and explored themes guiding further design decisions. Beside the interactions in the field we spend a substantial amount of time amongst our academic team and the wider research community debating and reflecting on data collected and further topics to be investigated. In short, we pursue what we call community-based co-design under the auspices of participatory design and ethnographic action research principles with a dialogical approach.

2.3. Erindi-roukambe

Erindi-roukambe, a rural community in eastern Namibia, consists of eighteen homesteads with approximately two-hundred Herero inhabitants in peak season. The village architecture follows Herero tradition, with precise locations for places, objects and activities. For example, all houses face west, looking at the cattle enclosure. Some of the homesteads have a distinctive fire, referred to as the holy fire, which is always positioned between the house and the cattle enclosure. Wild animals are slaughtered and cooked at the back of the house and red meat is cooked at a different place from the rest of the meal. Part of the indigenous knowledge possessed by the community members relates to the familiarity and interaction with the surrounding environment. Landmarks, such as trees and rivers, are used to determine current locations and provide directions for locations that need to be reached. Activities are collective and engendered, such as men branding cows and women cooking together. Communication is predominantly synchronous and oral, with hardly any messages conveyed in artifacts such as text, visuals or semiotic objects. The use of cellular phones is restricted due to a lack of cell towers in the vicinity. Computer literacy has only evolved within the co-design process. (Kapuire et al, 2010)

2.4. Design outcome

We have co-developed a 3D graphic visualization tool running on a tablet where users can create a village consisting of people, animals and objects, all chosen by the community members. The objects were grouped in subcategories under expandable buttons. We have implemented six different finger gestures for interacting with the tablet: three are single finger gestures used for selecting and dragging objects on the screen as well as a highly sensitive camera control to view objects from all perspectives, and three two-finger gestures for sizing and moving the plane, as well as turning objects. (Rodil et al, 2012)

The current tool is the outcome of a number of iterations and intermediate focused studies, in which we have established specific issues of representation and recognition. For example in an early phase in which we presented a fully designed village, we realized the lack of recognition of the representations and orientations (Rodil et al, 2011). Consequently, we undertook a number of studies to establish what, how and in which perspectives we should present representations to ensure both recognition and immersion (Jensen et al, 2012). Community members who were involved over a longer period and who have understood the principles of critical feedback and design input have substantially contributed to shaping the product to their liking.

2.5. Contextual methods established

We would like to present two methods, which we have used within our design endeavor and consider particularly interesting in the context of fast tracking the adaptation and appropriation of such a graphic tool into other communities.

To ensure that we capture the essentials from a local perspective entailing appropriate representation and high recognition, we established PictIT. The method is based on an adaptation of the board game 'Pictionary'[1], to explore representations of local concepts to inform designers. Concepts extracted from local narratives were drawn by one community member, until the representation was accurately recognized by the other community members. These drawings were complemented by a set of individual drawings depicting what matters within a given context. These drawings were then taken to members of another local Herero community and an international context to verify recognition within and across cultures. Recognized drawings are then forwarded to the graphic designers for further processing and later verification by the local community. Although our findings confirmed that cultural practices for representing concepts are not always transferable to other contexts and even other communities, we promote PictIT as a new method to fast track informing locally valid graphic design. (Winschiers-Goagoses et al, 2013)

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[1]Pictionary is a word guessing board game designed by Robert Angel and published by Hasbro since 1994.

Secondly, we have endorsed community consensus, a practical method within community-based development, replacing an aggregation of split data collected from individuals (Winschiers-Theophilus et al, 2012). In many African communities, participatory assemblies and group decision-making is common practice. Bujo (2009) reports how problem solving strategies in a Congolese community can be time consuming but effective as they consist of sharing experiences, recounting historical events, including the interests of the living and deceased, and only conclude once consensus is accomplished. Although this approach still encounters skepticism in the Western scientific community, we have conducted community design and usability evaluation sessions leading to comprehensive recordings of dialogue beyond the quality of the sum of individual statements. This method allows designers to gather a deeper understanding of the community's perspectives and further allows the community to create new insights within the dialogue. However, such methods, based on a collectivist world-view, work as they are rooted in the cultures practices, preferences and aspirations; thus Mkabela (2005) speculates that they may have adverse effects when used in Eurocentric contexts which place greater value on individualism. Yet according to Bohm (2007) such 'dialogues' can be implemented in individualistic societies with a set of rules and principles to be followed by the participants.

3. TRANSFER TO 'ELSEWHERE'

The Namibian government is interested in the development of a nation-wide system to digitally preserve and document indigenous knowledge. Thus we are now considering adapting and deploying the pilot system to other communities.

3.1. Concerns of Transformation

Experiences and findings that we have accumulated in one context have shown that locally appropriate design is a nontrivial task. Even though we have experienced a positive progression in our iterative cycles of design in the village, we do not yet know if this holds outside of our existing sphere of intervention. One could argue that if one context reflects a story of success, then the methods are equally applicable in a similar context. Yet we are aware that within the action research cycles, mutual learning has transformed us and the community in terms of skills, understanding of technology, cross-cultural interactions and world views (Rodil et al, 2012b). We have regularly asked ourselves the question of how representative our co-designers in Erindi-roukambe are of other Hereros or Namibian rural dwellers. The elders have reached higher computer/tablet literacy than many other Namibians. Accordingly, their seemingly intuitive usage of technology, and tablets specifically, could be attributed to the digital literacy acquired from a longer period of being exposed to IT artifacts.

Even more worrying are the side-effects of our long-term intervention. Does the transformative effect of our intervention lead to non-generalizable results or non-transferable design? It should be noted that transformation is an explicit aim of action research.

3.2. Exploring usability and appropriation

We are particularly interested in verifying whether rural communities, who were not part of the design process, perceive the tool as equally intuitive, engaging and useful as the community members from Erindi-roukambe. We have specifically observed the finger gestures, locating of object, feelings, voluntary length of engagement, creations, as well as expressed feedback and usage possibilities.

Evaluations were conducted by a researcher sitting with one participant, and using a translator if necessary. We introduced new features progressively as the participants familiarized themselves with the application (see Figure 1). Once all features were introduced, we observed the participant freely creating a homestead without any interruptions unless the participant was continuously struggling or requested assistance. All interactions were video recorded for post-analysis. The prototype also features a logging component tracking all interactions, placements and rotations of

virtual objects in XML format. This is to be able to reconstruct the designed homestead for other purposes such as replaying the virtual building of the homestead with recorded narration. At the end, the prototype takes a screenshot of the virtual homestead created. Field notes were used for minor observations.

At two sites, we have also deployed PictIT to confirm the suitability of the method and to forward relevant information to the graphic designer for a real appropriation of the tool.

Figure 1 - Participants in Witvlei familiarize with the prototype

3.2.1. Witvlei area

Witvlei area, located east of Namibia, consists of a number of government allocated resettlement farms. One of our co-authors, from the agriculture department, is responsible for training the resettlement farmers in the Witvlei area, as those farmers do not necessarily have the skills required to manage their farms in an economically and environmentally viable manner. Our colleague gathered 10 farmers to evaluate and discuss the application of a 3D graphic system in farm management. Only two farmers have used a computer before. All farmers are Herero, identical to the community members from Erindi-roukambe, and therefore having the same practices and traditions. The approximate linear distance from Witvlei to Erindi-roukambe is 100km. Both places share similar environmental characteristics, as well as dress code, housing architecture, animals and other objects included in the tablet application.

In Witvlei, the participants, who individually evaluated the tablet application, consisted of one younger woman, one middle-aged woman, one elderly woman, a young man and one middle-aged man. Combined use of system for the 5 participants was ca. 2 ½ hours. All of the participants were able to use the prototype to complete the task of recreating a homestead, and none of the participants expressed anxiety or struggled with functionality besides the orientation of the virtual cameras. The women learned the handling of miniscule objects faster than the men. The categorization of objects was intuitive. The participants expressed great interest in using the tool for their farm management with an exact representation of their life stock. They requested for specific representations of concepts such as buying, selling and slaughtering cows as well as livestock affecting events, such as marriage and funerals. For this purpose we deployed PictIT, with two rounds of representation and recognition of drawings. In general the drawings were minimal and we attribute recognition to the high shared context of the participants, which would equally be the case within a farm management tool. The participants also suggested an alternative drawing exercise in which they simultaneously draw on one picture rather than individually and sequentially. The two day gathering was closed with a community discussion on the application, in which additional feedback was gathered.

3.2.2. Talismanus

Talismanus is a small town located in eastern Namibia, approximately 50 km from the border of Botswana and a linear distance approximately 100km from Erindi-roukambe. The town acts as a larger hub for farmers or farm-related workers in the area. The participants in Talismanus consisted of two middle-aged men, an elderly woman and an elderly man, who were recruited at the local meeting place on a voluntary basis. Besides one of the middle-aged men none of them have used a computer before. Combined use of system for the 4 participants was ca. 2 ½ hours. All participants handled the application with great precision and engagement. The participants had no problem in finding the objects of their choices and mastered the gesture input well. Two participants used the prototype to share knowledge with one of the researchers not from Namibia. Thus, elucidating that the system might not only transfer knowledge within a demographic but can also act as an informant for design and cultural traits.

3.2.3. Long Lamai

Long Lamai, is a remote Penan village in upper Baram East Malaysia, consisting of approximately 100 households. One of our co-authors, based in Malaysia, has been working with the community since 2009, in which he has established a framework for community-based development including a cultural protocol (Zaman et al, 2011). His earlier visit to Erindi-roukambe has inspired his technology choice in a local plant knowledge preservation project.

Long Lamai is a very lively and balanced, in terms of gender and age, village next to the river consisting of individual (long) houses on poles, surrounded by the rainforest. The telecenter allows full internet connection and Wi-Fi within the village. A number of households own their own laptops, with children spending a substantial number of hours playing but adults also use them for preparing speeches and letters. Most people build their own houses; engage in rice and other farming, supporting a semi-sustainable life. The community members have maintained and further developed a harmonized asynchronous forest sign language. The decisions are taken on an egalitarian basis and through community consensus making.

As part of a four day visit by one of our African based researchers, we explored the prototype usability and usage possibilities with two elder men, one elder woman and one middle-aged man. We also collected appropriation data through walks, individual drawings, PictIT, as well as prototype evaluation feedbacks which will be relayed to graphic designers.

All participants easily recognized the objects and selected objects most similar to theirs (like houses, trees) for constructing a homestead. Participants found the categorization of objects peculiar but the selection and dragging of objects intuitive. However the gestures requiring two fingers were only properly managed by the two of the semi-computer literate participants. One of the participants engaged for hours and expressed the desire to use the system as a landscape planning and management tool. Within the spontaneous interaction between the researcher and participant the tool was used as language learning system. The other participants have clear ideas which elements of their environment should be represented in the system, such as medicinal plants. In both PictIT sub-sessions, we observed a high drawing precision and recognition speed.

Figure 2 - Left: Participant in Long Lamai uses the prototype. Right: Participants in Long Lamai engaged in PicIT

4. DISCUSSION

After a long period of a situated co-design with the rural community in Erindi-roukambe we have explored the usability and usage opportunities of a matured 3D graphics prototype and its corresponding appropriation methods at three different sites. Although we have observed similar successful intuitive use and engagement with the tool we speculate on four issues at the core of cross-contextual transferability for further critical reflection.

4.1. Community engagement

The depth of community rapports build, as well as the engagement in a co-design endeavor has enabled us to 'see the world from within the community', enabling us to co-construct a locally meaningful system. While we have learnt to implement a local perspective we have also implicitly revised our own original assumptions and frameworks and thereby discovered fundamentally valid and invalid design paradigms. Thus we argue that deeper immersion in cross-cultural interactions lead to co-design of more 'transferable' objects, which could explain the successful transmission across the continents, from Namibia to Malaysia.

4.2. Transformation

At the beginning of the development of an indigenous knowledge management system for rural elders, we engaged with the Erindi-roukambe community. At that point of time the community was considered "representative" and a typical rural Herero village, interchangeable with many others as a pilot group. Yet over time some community members have become co-designers, others co-facilitators and others participants. The interventions have not only changed our perceptions but also the ones of the community members. Similarly we would like to caution the perceived wisdom that situated design and research, such as "living labs" are the ultimate goals of ICT4D methods. Living labs are a first step to get rooted in reality but after a number of years the community members may take on co-supervisory role with our new students and become sophisticated consumers of modern electronic devices. Thus the question becomes whose representatives the community is. We have clearly observed the different levels of feedback provided by the designer community versus the three transfer communities.

4.3. Context

We attribute some of our successful evaluation to the fact that developing rural contexts have much more in common than it seems at a descriptive level, which also has been recognized by many funding agents therefore encouraging south-south collaborations. In our choice of contexts, with two communities with similar ethnic background and similar environments, we could equally claim that the Malaysian community is much more similar in the sense that it has the same

intentions as well as development of technology. The communities' intentions of use and in particular if they are build on some pre-existing community need/interest are an important basis for contextual comparison. Our study has illustrated the successful transferability of concept, methods and product to those three communities. A detailed analysis of the results and a more systematic description of the contexts should be investigated and described to anticipate further transferability options.

4.4. Approaches of cross-context validations

We would encourage a spontaneous cross-context validation of intermediate findings. In our development process we have continuously cross-checked findings against results presented in the literature as well as conducted our own cross-contextual validity checks such as representation and recognition focused studies. We would however like to caution the use of superficial cross-cultural and cross-contextual studies for deeper conclusions and influencing design decisions. It is likely that a strong community based living lab (such as RLabs, www.rlabs.org) which continually extends to larger and larger parts of the community has an inbuilt tendency to avoid this obstacle to extensibility. Another commendable approach has been practiced in east Malaysia, where pilot communities with successful ICT interventions have started coaching fellow communities (Zaman et al, 2011).

5. CONCLUSION

Our approach to ICT4D research has, unsurprisingly, a strong developmental aspect. It is reflected in our underlying methodology of Action Research. Fundamental to this method is the combination of developmental transformation in our partner community (the *action*) and in us and the generation of transferable knowledge (the *research*) for us and the community. However, operating within a single context for a longer term, resulting in the mutual learning that is a necessary and desirable consequence, can obscure the transferability and recoverability of the results. Thus 'moving away' becomes a necessity to explore cross-contextual validity for theory building and explicit lessons learned.

Our design principles and interactions are deeply rooted in a situated paradigm co-creating locally meaningful applications. On the other hand we strive for cross-contextual transfer of findings, methods and products, where applicable. We have co-created a 3D graphic application with a rural community in Namibia within a longitudinal research project. We have then chosen three rural communities with two seemingly very similar to the development context in terms of ethnicity and environment, and a third one on another continent yet similar in its underlying intention of usage, namely knowledge transfer to the youth. In all three cases the usability and engagement has shown equally good results implying a successful evaluation and therefore cross-contextual validity of our approach.

However we wish to caution pre-mature conclusions on transferability without a more profound understanding of the depth of community engagement, transformation, contextual similarities, and cross-contextual validation. We speculate that only deep community engagement in a situated design context can bring about new findings and knowledge promoting the applicability of a design or a process across contexts. And even though community members transform through the interactions and seem no longer representative only them can provide locally meaningful feedback and become coaches for cross-contextual replications.

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