Stories from the Field: Mobile Phone Usage and its Impact on People's Lives in East Africa

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Abstract— **In this paper we present results from contextual interviews and observations, which we conducted in Tanzania over a period of six weeks. In our interviews we focused on use cases and benefits that the mobile phone introduced in these areas. Specifically we were interested in the impact of mobile ICTs on social networks in general and communication with friends and family in particular. The goal of the study was to identify potential areas where ICTs could improve people's lives. Based on an analysis of the results from this study we created personas, which describe archetype mobile phone users and their respective needs and goals. The paper concludes with a number of directions for further research in this area.**

Index Terms—**Developing nations, mobile communication, social factors**

I. Introduction

The growth and impact of mobile phone usage in developing regions in Africa has been widely discussed in the past few years. Many studies have been presented that reveal insights into the usage of mobile phones by people living in these regions. Samuel et al. [1] conducted an extensive study in 2004, where they interviewed 457 people living in urban and rural South Africa and Tanzania. Their study revealed interesting insights regarding the demographics of phone owners and phone users (people who have access to a phone, without owning one themselves). For example they were able to show that there was a positive relationship between income and mobile phone usage for South Africa. Albeit responses showed that making calls was also important for people with very low income. Targeting at communities, which were expected to be among the poorest in their countries, they came to the conclusion that the mobile phone was not at all being perceived as a luxury good for the rich. According to this study the main impacts of using mobile phones were improved relationships, reduced travel costs, easier communication with family and friends, getting help in emergency situations, and assistance in job search, to name the most frequently cited responses. Another study used data from nationally representative household surveys that were conducted in 17 African countries to reveal statistically significant insights into adoption and usage of mobile phones [2]. The surveys were conducted during the end of 2007 and the beginning of 2008.

The goal of the research presented in this paper was to augment the quantitative data collected in other studies with qualitative data about the current situation of mobile phone adaption and usage in Eastern Africa. While other studies mainly focussed on providing statistically representative data to inform current developments in the mobile market, we were particularly interested in individual stories and experiences of mobile phone users. A qualitative analysis of data is specifically important for informing the design of new systems [3]. Thus the significance of the study results reported in this paper lies in its value for researchers and designers of new ICT applications for the East African market.

In the remainder of this paper we present related work, our methodological approach, the study participants, impacts of mobile phones, and directions for further research.

II. Methodology

We conducted contextual interviews with people living in rural Zanzibar (the island of Unguja, a part of Tanzania) and Zanzibar City broadly following an ethnographic approach. The interviews were carried out at the end of 2008 over a period of six weeks. We prepared a set of questions regarding the interviewee's demographic data and mobile phone usage that allowed us to conduct unstructured interviews. Therefore the data collected during interviews varied largely depending on the interviewee and the way the conversation took during the course of the interview. Due to the ethnographic approach interviews often were not limited to one-time encounters with people. In many cases we met people several times before asking them for an interview. This was important in order to build up trust between the researchers and the interview partner, which was crucial for our research since we were interested in their stories rather than statistical facts.

Most of the interviews were carried out in Jambiani, a beach town of Zanzibar, and Stone Town, the old part of Zanzibar City. This allowed us to create strong links and connections

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with the locals by being part of the everyday life in these places. It further gave us access to people, who we might have otherwise not been able to interview, such as the Counsellor of Jambiani.

The video material that we collected during the field research was reviewed and analysed in three sessions attended by one of the researchers, who was participating in the field study, as well as another researcher from our group. Both researchers took notes while reviewing the video material. This process followed the contextual inquiry approach, which suggests holding team interpretation sessions, allowing every team member to "bring his or her unique perspective to the data" [4]. Based on the user research data we created personas of archetype mobile phone users in East Africa. Personas are powerful and well-established tools for user modelling in design and used to complement other user-centred design methods [5]. Thus, they represent valuable foundational tools for further research in this area.

The research described in this paper is part of a larger project, which investigates the potentials of information-communication technologies (ICTs) for improving the quality of life and work in East Africa. Thus, our approach of using ethnography embedded in a contextual design process [4] is partly grounded in literature on the use of ethnographic inquiry as tool for the design of computer-based systems [6]. Most studies on the use of ethnography in this field are based on work that was conducted in an organisational context. There is less information available in literature regarding a similar application of ethnography for studying potential work practices involving ICTs in a developing context. However, there is currently a field of research emerging around these issues, which also discusses implications and applications of similar approaches, such as user-centred or participatory design [7].

III. Participants

We randomly approached people for face-to-face interviews. Our aim was to receive data from a vast range of people, regarding their age, profession, income, gender, and whether they lived in an urban or rural area. Overall we conducted over 50 interviews, of which we selected 29 for further analysis, based on the quality of the interview. Eight of the interviews were conducted in Zanzibar City and 21 interviews with people living in Jambiani. Seven of the interview partners were female. The reason why most of the interviewees were male was that we observed and interviewed them during their daily work activities and it is still a common situation in these regions that the husband is working in a job, while the women are staying at home.

All interviews conducted in Zanzibar City were done in English. Eight of the interviews conducted in the rural part of Zanzibar, Jambiani, were conducted in Swahili. A local person from Jambiani, who was fluent in English, served as interpreter for these interviews. Most of the interview partners were between 20 and 30 years old.

Of all interviewees, six people worked in tourism, two people worked at the local school of Jambiani, one person was working for the local government, and one person was homeless. Other professions of people included watchman, fisherman, student, etc. Seven people owned a Nokia phone, six people owned a Motorola phone, one person owned a Chinese phone that allowed her to use two SIM cards at the same time, the remaining participants either did not reveal which phone they used or it was not reproducible from analysing the material. Our sample also included three people, who did not own any phone or SIM card; only one of them stated that he would sometimes borrow the phone for calling.

IV. Results

Additionally to participants' demographic data, we collected user stories and recorded benefits and issues of mobile phone usage. Below we provide an overview of the identified issues categorised into usage scenarios, favourite features, requirements, and benefits.

Usage scenarios:

People used their mobile phone for the following purposes: to find out what other people are up to; to call people at work, who are not in the area to give them instructions; using 'beeping' when calling someone to save costs; sending money to their family; memorising events (using the mobile phone camera); access to the Internet through WAP; taking photos of friends and family and printing photos at a shop; sharing music with friends.

Favourite features:

Features that our interview partners particularly liked on their mobile phone were: using custom ring tones; listening to music (radio) on the phone using headphones; torch; Bluetooth for exchanging audio (ringtones) and video files; games.

Requirements:

The following technological and design requirements were mentioned to be important: the phone has to be very durable; it has to be "strong and cheap"; it still has to work, after putting it into water. A requirement that was often mentioned was the importance of having a phone that does not easily break and would even work after falling into water.

Benefits:

People mentioned the following benefits of having access to or owning a mobile phone: the phone is important for maintaining family contact; less costs and time spent on travelling home; they can call their family directly to have a "good conversation" rather than giving a message to someone, who is going back to their home village.

Other:

Generally, having access to a phone had a very high relevance to our interview partners. Another observation was that people often did not carry the phone with them, since it was being recharged at their homes when we met them. This was even the case for a person, who was running several

Fig. 1. The mobile phone as fashion object and status symbol.

businesses, thus one would assume that it would have been crucial for him to have constant access to his mobile phone. Many people complaint that their batteries did not last very long and that new batteries were expensive to buy. People, who needed the phone for their jobs, stated that the phone and calling costs were carried by their employer. Only one person mentioned the costs of making phone calls, although when we asked, people revealed that they were spending a considerable amount of their income on airtime. For example, a woman working in a hotel said that she would spend about one to two thousand Tanzanian shillings per day. (The average per capita income per day was about 1,500 Tanzanian shillings in 2008[1].)

We also met a few people who were wearing their mobile phone in a custom-made bag around their neck (Figure 1), which demonstrates the value that the mobile phone has for them. For most people their mobile phone was more than just a communication tool, but also something they were proud of owning. This observation is supported by Kyem and LeMaire's research [8], which showed that mobile phones have become a status symbol in less developed countries, especially for young people.

One interview partner was concerned about potential health risks connected with using mobile phones. While he thought that talking on the phone represented a health risk, he stated that texting was no problem. He also owned a mobile phone himself.

V. Interpretation and Discussion

After analysing the data collected in the field, we created personas, which we subsequently used for categorising impacts of mobile phones on the lives of people in East Africa. This section also presents implications for research derived from our study, augmented with facts from recent similar studies in the field of ICT4D.

[1] U.S. Department of State, Bureau of African Affairs, February 2010, http://www.state.gov/r/pa/ei/bgn/2843.htm

A. Personas

Based on the results from our user research we derived the following personas, which we used for further interpreting the data.

The Tourist Guide uses his mobile phone extensively for business purposes. It allows him to coordinate people working for him, such as taxi or boat drivers. He uses business cards featuring his mobile number, which he distributes to potential costumers. This enables him to increase his turnover, as he is able to more efficiently manage tours and costumer requests.

The Musician is frequently using his mobile phone to connect with his family and friends, but also uses it in his profession. He records songs, loads them on his phone and distributes them via Bluetooth. Thus, the mobile phone provides him with an easy, simple and effective way to share his music and become more popular.

The Watchman is very fond of his mobile phone as it allows him to be more flexible and react to work assignments immediately. Further he can coordinate his work duties with his family at home and it gives him the possibility to connect with friends and occupy himself at times when work is not very demanding. Before he started using a mobile phone he often passed on messages for friends who lived far away to travellers.

The House Keeper has a mobile phone for work, which is paid by her employer. It helps her to keep in touch with her subordinates and allocate work more efficiently. She uses her private phone to connect with friends and family and also uses it to send money to her family.

The Teacher uses her mobile phone for many different purposes. Like most other Tanzanians she does not own a computer and therefore takes advantage of the mobile phone's multimedia functions, for example to download and watch movies. She also uses other applications available on her mobile phone, like the calculator. Her little son is already familiar with he device as well and takes pictures and plays games with it. Her students are not allowed to use their phone during lectures, but she sometimes films her students, to "make them happy".

The traditional Fisherman currently sees no need for owning a mobile phone. His concerns were that there is no phone reception, when he is on the waters anyway. A further issue was that the phone would very likely get wet during his work. Typically being part of the elderly generation he has difficulties seeing a need for this new technology or using it. Although the traditional Fisherman is not a mobile phone user, we included him in our set of personas, to provide an example for a persona that does not rely on mobile phones.

B. Impacts of Mobile Phones

The benefit of mobile phones that was most often mentioned by our interview partners was the possibility of having regular contact with their family or parents. On second place people mentioned the value of being able to call friends, for example to find out what they were up to. The reason for this is that many people have to move to another part of their country for work, thus they are leaving their family behind.

They make new friends at the place where they work, which makes it easier to stay in touch with them, even if there was no mobile communication. However, many did stress how easy it has become to find out what local friends were up to.

As Sinha [9] pointed out, this increased contact with friends and family even on an international level generates social capital which is not per se positive but does in fact generate possibilities for an economic and social improvement of the situation for many people.

Kyem and LeMaire [8] showed that mobile phones have become a status symbol in less developed countries, especially for young people. Further, mobile phones are now the primary tool for socialising with other people. Another particularly interesting finding is that mobile phones may either strengthen or weaken the traditional household, as on the one hand people could become linked closer to the people on their communication network than in their household, on the other hand the bonds between distant relatives could be strengthened.

C. Directions for Further Research

Based on the analysis and interpretation sessions, we propose a number of potential application areas in this section, where ICTs or particularly mobile phones could improve the quality of people's lives.

Photo storage and sharing:

What has been already taken to a semi-professional level is the usage of the mobile phone as photo and video service, both passive and active. People send each other pictures and videos they downloaded or took themselves. During our field study we attended a wedding, where a photographer was employed to take pictures with his mobile phone. Having the photos available on a mobile phone subsequently makes it easer to share them with others at no costs.

One problem here is the limited storage space of mobile phones. Often the owners of mobile phones have to decide which of the pictures they want to keep and which they delete to make room for new photos. Even if mobile phones offer sufficient storage, it is cumbersome to manage large amounts of photos on these small devices. There are services available that produce printouts of mobile photos, but this makes sharing them more difficult and expensive. Another issue is that mobile phones only allow sharing photos peer-to-peer but not to a wider audience, i.e. many people at the same time.

Marsden and his colleagues developed solutions to support managing photos on mobile devices [10] as well as for photo sharing [11]. Another solution to address this problem would be the introduction of small and durable low-cost storage spaces that can be directly connected to and accessed from mobile phones via appropriate interface formats.

Promoting educational use of Bluetooth for exchanging data:

In our encounters and interviews we discovered that the predominant networking technology for exchanging files between mobile phones was Bluetooth. However, current research and ICT4D projects largely seem to ignore this technology. Since music and video sharing between mobile phone users is very popular, Bluetooth could be used to disseminate media in the educational sector. Similar to the application of Bluetooth in advertisement in Western countries, a potential solution would be to introduce hot spots for collecting relevant files in community centers in villages. This could include educational videos or audio recordings, local news, or even medial information.

While there seems to be a large potential of integrating mobile phones into classroom teaching, it is currently not allowed to use them in schools. Therefore, a challenge would be to convince teachers about the value of mobile phones for education first. A good approach to address this would be by applying a participatory design process and involving teachers as co-designers.

Mobile phone as general access tool:

For the majority of people we encountered during our field study the mobile phone was the single piece of technology they possessed. Some owned a radio or television set, only a few mentioned that they also had access to a personal computer. In most cases the mobile phone was the only device capable of things like keeping track of time and date, calculating, and taking pictures. Another popular feature was the mobile phone's torch application. Considering this convergence of services onto a single device combined with features, which are specifically targeted at the market in less developed countries poses several interesting research questions. How can the convergence of simple technology and attributes such as robustness and durability converge with high tech requirements such as 3G and ever improving integrated photo cameras? Can the developments and innovations of companies operating in less developed countries influence the ways and habits of how these companies work in the West? Will – with the introduction of sufficiently fast mobile internet at verge – the technological development in less developed countries, after having leapfrogged the fixed line telephony also leapfrog computers as primary input devices for browsing the internet and at workplaces?

Probing business models:

The mobile phone users we observed during our research showed a very different usage pattern to what we are used to in Western society. Pre-paid payment models, owning of several SIM cards and calling from several phones is a regular habit and does not fit the idea of a particular number identifying a certain user. Therefore the business model of Movirtu[2], providing the flexibility to operate from a unique custom account on top of every phone seems very promising. Will people prefer this model, which is closer to a Western usage pattern? Or does the "multiple SIM cards" pattern, which amongst others allows them to chose the group towards which they want to appear as "online", better conform with their usage of mobile phones as we observed it in this study?

[2] Movirtu Limited http://www.movirtu.com/

Mobile phones as source of information in agriculture

Zanzibar has a large seaweed industry; most of the seaweed farmers are women (up to 90%). A typical problem that farmers in rural areas of Africa are facing is that they are not aware of the market prices for their products at the time they are selling them to an intermediary [12]. A straightforward technical solution to this problem is the introduction of an SMS-based trade information system, which has successfully been applied in other projects. Further Abraham [13] observed in his research of the fishery industry in Kerala, India, that mobile phones contributed significantly to a better alignment of supply and demand over time, resulting in major benefits for the fishermen concerning income and reduced waste.

However, what seems like a potential solution for improving the economical situation turned out not to be feasible in the context of seaweed farms in Zanzibar. The problem there was of much more complex nature, since the seaweed industry was controlled by the government. In fact, there were only two companies (one Tanzanian and one Japanese), which were having a monopole in the seaweed market. Therefore, ICT can and should not be easily considered as the remedy to all problems in less developed countries. Instead, a careful investigation and consideration of the local context as well as political and ethical issues always need to be considered.

This observation points out the necessity of involving different experts in any design process that touches potentially complex structures, such as the seaweed farming industry described above. ICT's bring a large potential for improving people's lives in less developed countries, but sometimes the solution requires other forms of interventions first, in order to guarantee a successful introduction of ICT applications, without harming the existing cultural and social structures.

Furthermore, the successful adoption of ICTs require the existence of minimal infrastructures [8]. For example, if there are no adequate transportation infrastructures, farmers might depend on selling their products to an intermediary, even though they would be able to increase their profit by directly selling them to the last entity in the supply chain.

VI. Conclusion

The study presented in this paper confirmed the results from other similar studies regarding the importance of the mobile phone for social contact with friends and family. The majority of our interview partners stated that being able to have contact with their family was the most important aspect they associated with the mobile phone. This was followed by being able to call friends to find out what they were up to. Compared to other studies we identified less cases of shared mobile phone access, most likely due to the increased penetration of mobile phone usage even in rural areas. Many stated that the mobile phone was also important for their job, since it allowed them to react to work assignments quicker and to better coordinate their team.

The second most important use case of mobile phones that participants pointed out regarded the phone's camera capability. People used the camera to record memories from their everyday live as well as during festive events, such as weddings. The advantage of using the mobile camera, rather than a traditional photo camera, is that it allows for instant and free sharing of photos with other people.

Generally we noticed a convergence of services onto a single device, as discussed by Marsden [14], mainly because the mobile phone typically represents the only computerised device that people own. This trend suggests that people in less developed regions might leapfrog the personal computer as main device for work and activities, like browsing the Internet.

We concluded this paper by pointing out a number of potential areas for further research based on the analysis of the data collected in the field. This includes photo sharing and storage, promoting educational use of Bluetooth for exchanging data, mobile phone as general access tool, probing business models, and mobile phones as source of information in farming. However, in many cases the successful introduction of ICTs depends on other supportive requirements, such as infrastructure developments and ethical considerations.

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