DESIGNING DIGITAL STORYTELLING FOR RURAL AFRICAN COMMUNITIES

By

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to my parents Jürgen and Angela Reitmaier.

ABSTRACT

Chon gilala – a long time ago – says Mama Rhoda of Adiedo, Kenya. She looks deeply into our eyes. We record her rhythms and rhymes as she sings and tells a story about her grandparents. She shows us the exact spot where her great-grandfathers and his friends used to sit and drink and how her grandmother used to dance.

This thesis situates digital storytelling in rural African communities to enable rural people, like Mama Rhoda, to record and share their stories and to express their imaginations digitally. We explore the role of design, and the methods and perspectives designers need to take on to design across cultures and to understand the forms and meanings behind rural African interpretations of digital storytelling. These perspectives allow us to 'unconceal' how our Western storytelling traditions have influenced design methods and obscure the voices of 'other' cultures.

By integrating ethnographic insights with previous experiences of designing mobile digital storytelling systems, we implement a method using cell-phones to localize storytelling and involve rural users in design activities – probing ways to incorporate visual and audio media in storytelling. Products from this method help us to generate design ideas for our system, most notably flexibility.

Leveraging this prototype as a probe and observing villagers using it in two villages in South Africa and Kenya, we report on situated use of our prototype and discuss, and relate to usage, the insights we gathered on our prototype, the users, their needs, and their context. We use these insights to uncover further implications for situating digital storytelling within those communities and reflect on the importance of spending time in-situ when designing across cultures. Deploying our prototype through an NGO, we stage first encounters with digital storytelling and show how key insiders can introduce the system to a wider community and make it accessible through their technical and social expertise.

Our mobile digital storytelling system proved to be both useable and useful and its flexibility allowed users to form their own interpretations of digital storytelling and (re)appropriate our system to alternative ends. Results indicate that our system accommodates context and that storytelling activities around our system reflect identity. Our activities in communities across Africa also show that our system can be used as a digital voice that speaks to us, by allowing users to express themselves – through digital stories – in design.

PUBLICATIONS

Some ideas, figures, and tables of this thesis have previously appeared in the following publications:

Bidwell, N. J.*, **Reitmaier, T.***, Marsden, G. & Hansen, S. (2010), «Designing with Mobile Digital Storytelling in Rural Africa», in «Proceedings of the 28th international conference on Human factors in computing systems – CHI '10», pp. 1593–1602, ACM Press, New York, New York, USA, URL http://doi.acm.org/10.1145/1753326.1753564, *Joint first authors.

Marsden, G., Ladeira, I., **Reitmaier, T.**, Bidwell, N. J. & Blake, E. (2010), «Providing a Digital Voice for Storytellers in Africa», in «Proceedings of the 8th Culture and Computer Science Conference», pp.101–132, Berlin, Germany.

Marsden, G., Ladeira, I., **Reitmaier, T.**, Bidwell, N. J. & Blake, E. (2010), «Digital Storytelling in Africa», *International Journal of Computing*, vol. 9 (3), pp. 257–265

Reitmaier, T., Bidwell, N. J. & Marsden, G. (2011), «Situating Digital Storytelling within African Communities», *International Journal of Human-Computer Studies*, vol. 69 (10), pp. 658 – 668, URL http://dx.doi.org/10.1016/j.ijhcs.2010.12.008.

Reitmaier, T., Bidwell, N. J. & Marsden, G. (2010), «Field Testing Mobile Digital Storytelling Software in Rural Kenya», in «Proceedings of the 12th international conference on Human computer interaction with mobile devices and services – MobileHCI '10», pp. 283–286, ACM Press, New York, New York, USA, URL http://doi.acm.org/10.1145/1851600.1851649.

Reitmaier, T. & Marsden, G. (2009), «Bringing Digital Storytelling to the Mobile», in «Human-Computer Interaction – INTERACT 2009», vol. 5726 of *Lecture Notes in Computer Science*, pp. 750–753, Springer, Berlin / Heidelberg, URL http://dx.doi.org/10.1007/978-3-642-03655-2_81.

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NOMENCLATURE

ICT4D	Information and Communication Technologies for Development
ICT	Information and Communication Technologies
CDS	Center for Digital Storytelling
CH	Cultural Heritage
CMC	Community Multimedia Center
CRLS	The South African NGO Centre for Rural Legal Studies
CTP	Critical Technical Practice
FTX	Feminist Tech Exchange
HAP	Human Access Point
HCI	Human-Computer Interaction
HCI4D	Human-Computer Interaction for Development
NGO	Non-Government Organization
NPO	Non-Profit Organization
NUI	Natural User Interface
PD	Participatory Design
PRA	Participatory Rural Appraisal
PyS60	Nokia port of Python on Symbian Series 60 Operating System
UCD	User-Centered Design
UN	United Nations
UNDP	United Nations Development Program

1 INTRODUCTION

Contents

We all have stories to tell, and they all play an important role in our existence. For stories are the "primary form by which human experience is made meaningful" (Polkinghorne, 1988). The tradition goes back long before humans learned to write. Storytelling was 'invented' when "millions of anonymous raconteurs … discovered how to turn their observations and knowledge into tales they could pass on to others" (Fulford, 1999). In addition to being ancient, storytelling is also modern, alive, and dynamic – a testament to the crucial role it plays in our existence. Storytelling has over millennia adopted, and adapted itself to, different media and technologies as they developed: from the advent of the written word in Mesopotamia and Egypt, through Gutenberg's printing press, radio, cinema, television, and all the way to the digital medium of computers, the internet, the World Wide Web, and hypertext.

The content of stories, or narratives, is as diverse as the genres that describe them. Examples of narratives include personal histories, tales and riddles, songs, poems and proverbs, and the stories we tell every day to explain our own and others' actions.[1] In fact, the way we tell stories varies not only from story to story, but also from person to person, and culture to culture.

1. We encounter many of these different forms of narratives during the design and evaluation phases of our digital storytelling system.

The latter observation becomes very clear when we compare and contrast how Western cultures communicate and tell stories with how people communicate in rural African communities. While communication practices in Western cultures have been "deeply affected by the use of writing" (Ong, 1982), the importance of human speech in African cultures "cannot be overemphasized" (Peek & Yankah, 2004, p. xii). Although "the primacy of the human voice and of the exchange of life through words is demonstrated over and over again in Africa" (Peek & Yankah, 2004, p. xii), electronic media, and especially radio and mo-

bile phones, are also widely used and have reciprocally influenced oral traditions across Africa (Spitalnik, 2004).

Likewise, electronic media has long been domesticated in Western cultures. For the most part, this type of media has been consumed in the form of broadcast or mass media. Only recently – enabled by advances in recording and distribution technologies – new trends have emerged, which have been labeled user-generated content, Web 2.0 (see O'Reilly, 2005), and new media (see Hearn et al., 2009). These advances enable media consumers to become media producers. They can be seen as corollaries of storytelling's most recent shift – the one into the digital medium. This shift has also led to the emergence of a new type of story – *the digital story*.

The terms 'digital story' and 'digital storytelling' are used equivocally. The most inclusive meanings of 'digital story' and 'digital storytelling' refer to the product or the act of producing a story in the digital medium that incorporates one or more different media (aural, visual, textual). The latter term is also used to refer to the digital storytelling movement/initiative, which was founded by Joe Lambert and the late Dana Atchley in the early to mid-1990s (Hartley & McWilliam, 2009).

Lambert and Atchley were among the first to recognize the power that lies behind personal digital stories, recorded as audio narratives and annotated with pictures and short video clips. But, producing these digital stories was, at the time, technically hard and expensive. Thus, they have been overwhelmingly produced by experts in broadcast media. In response to this exclusion of 'ordinary people' in broadcast media, Atchley and Lambert developed an exportable workshop-based approach that teaches ordinary people how to produce their own digital stories. In this workshop, the participants are provided with the necessary technical equipment, and the workshop facilitators teach the participants the media literacy skills they need in order to produce digital stories. Additionally, participants are encouraged to share and develop their stories with the group and the facilitators. Helped by the increasing accessibility and affordability of scanners, digital cameras, voice recorders, and personal computers, the digital storytelling movement has experienced exponential growth (Hartley & McWilliam, 2009). Yet, digital storytelling has not spread evenly across the globe, for digital storytelling still has its strongholds in the USA, northern Europe, and Australia, and has ventured little beyond these "digitally saturated areas" (Lundby, 2009).

Indeed, if we venture outside of the developed world and into villages such as Lwandile, South Africa, or Adiedo, Kenya, we find that digital storytelling is largely unknown or irrelevant. To be sure poverty, lack

of infrastructure, and (computer) illiteracy are among the causes for this. Still, we believe that digital storytelling could play a role in rural African communities, as there appears to be a high degree of compatibility between the rich oral storytelling heritage of those communities and the audio narrative of digital stories. In our research, we will use this compatibility to investigate digital storytelling's imbalance and seek to uncover other problems that may also contribute.

1.1 Motivations

Digital storytelling applications can offer unique value in enabling rural communities in developing regions to share local information (Frohlich et al., 2009a) and participate in decisions affecting their lives (Tacchi, 2009). Audio recordings, supported by images, can convey information that cannot be captured by text and aids communication for those who are not textually literate in their local language. In addition, digital storytelling systems can offer access to a variety of information, such as on health, advertising, and self-help (Jones et al., 2009). It is especially useful for tacit or performed knowledge that rural people routinely transfer informally, but is not easily abstracted (Bidwell & Browning, 2009).

1.1.1 *Digital storytelling, ICT4D & development*

Since the early 1990s, ICT4D[2] initiatives have moved away from installing rural telecenters, because these efforts have often resulted in restriction and failure (Heeks, 2008). A new wave of ICT4D research has emerged – ICT4D 2.0 – that focuses on how to deliver the Internet to the remaining five billion people who lack such access (Heeks, 2008). Learning from past failures, ICT4D 2.0 looks at technologies that already penetrate, such as mobiles, radios, and televisions, and seeks new ways to add computing and internet functionality. Despite such efforts, for many people living in the developing world "the Internet remains a distant or even unknown thing" (Dray et al., 2003). Although providing ICT for developing regions is not easy, ICT can play a large role in addressing the challenges of developing regions and there is a real need for innovative approaches (Brewer et al., 2005). To increase the impact of ICTs, emphasis is also placed on the ability to create and access local, community-generated content (Slater & Tacchi, 2004), which empowers

2. *Information and Communication Technologies for Development*

those involved with the ability to express themselves digitally – one of the most relevant and important skills to possess in this decade and beyond (Shedroff, 1999). The World Congress on Communication for Development also places high emphasis on appropriate communication tools for the poor. In the Congress' formulation of the Rome Consensus, which sets communication as a major pillar of development and social change, one of strategic requirements reads:

> Ensuring that people have access to communication tools so that they can themselves communicate within their communities and with the people making the decisions that affect them.
>
> —The Communication Initiative et al. (2007).

This places the development of digital storytelling systems that are designed around the poor's specific resources, capacities, and demands at the forefront of ICT4D research and well within major development initiatives.

1.1.2 *Mobile digital storytelling*

The limited reach of the telecenter model of previous ICT4D projects, makes workshop-based digital storytelling approaches, as advocated by the Center for Digital Storytelling (CDS), unsuitable. This is especially true in remote, rural areas where little infrastructure exists that could support such workshops. However, there is one digital device that has already diffused among the poor in Africa – the mobile phone. It reaches out to more than half the African population, and growth rates are currently fastest in the poorest regions of the world (Heeks, 2008). The mobile phone has had a tremendous impact on the livelihoods and lives of people everywhere, who are using the device for "both productive and personal uses through their daily routine" (Donner, 2009). Targeting it as our digital storytelling platform brings with it many advantages:

- most rural communities are familiar with mobile phones and the infrastructure is already in place to support them, even if no grid electricity is available
- even older feature phones, which are becoming increasingly available in rural African communities, have the computational power and input and output capabilities to create digital stories (see Jokela et al., 2008)
- the communication potential of the mobile allows for advanced services such as collaboration in storytelling and sharing to be implemented

6 and finally, the small size and mobility of the phone supports more spontaneous storytelling activities and simple, natural forms of co-present collaboration and sharing.

1.2 Objectives

The aims of our research are threefold:

1 to investigate what potential role digital storytelling systems could play in rural, African communities and what factors are standing in the way of adoption by such communities
2 to explore how to design a system across cultures to support a practice as culturally located as storytelling
3 and to determine if a mobile digital storytelling system can be developed that is compatible with the oral culture and context of rural African communities.

While we seek to build an appropriate and sensible system, we are aware that in building such systems we can only change, not represent storytelling practice, for if "technology is to provide an advantage, the correspondence to the real world must break down at some point" (Grudin, 1989). Thus, to be sensitive to the broader questions, outlined in Winograd & Flores's (1986) seminal work, of "how a society engenders inventions whose existence in turn alters that society" and "to understand the phenomena surrounding a new technology", we must open our research to the *question of design*. Through design, we can engage in an interaction of understanding and creation to make sense of not just how the systems we build operate, but also what forms and meanings they take on in use.

1.3 Organization of this dissertation

We explore these and other issues in the remaining chapters of this thesis, which is organized into the following chapters.

Chapter 2 reviews the literature we draw upon in formulating our research. In this review, we focus on digital storytelling initiatives, digital storytelling systems, and cross-cultural methods used by ICT4D researchers.

CHAPTER 3 explores how we opened our research to the question of design. In the chapter, we develop an account of the methodology we adopted in our research and pose three research questions.

CHAPTER 4 presents an ethnographic perspective of one rural South African community's communication practices. We show how we combined this ethnographic lens with our insights on digital storytelling systems into design a workshop. We then discuss how we used the results of this workshop to design a mobile digital storytelling system.

CHAPTER 5 discusses how we field tested a prototype of our mobile digital storytelling system in a rural Kenyan village. We describe how we assessed our prototype's usability and how we leveraged it to probe how rural, oral users might interpret and make use of mobile digital storytelling.

CHAPTER 6 demonstrates a realistic deployment of our system and how it can be made accessible to a community through trusted outsiders and technology savvy community members.

CHAPTER 7 then presents the main conclusions we drew from this research and a discussion of future work.

2 BACKGROUND

Contents

In this chapter, we review the literature we draw upon in formulating our research. We aim to assess this literature with a focus on rural, cross-cultural, African, and developing nation contexts. In particular, we review and evaluate literature on digital storytelling initiatives globally, and explore PC and mobile digital storytelling systems that include our own previous work. Finally, we synthesize literature in the fields of ICT4D and HCI4D[1] in order to learn about the methods and processes other researchers have used in these fields.

1. *Human-Computer Interaction for Development*

2.1 Digital storytelling initiatives

In this section, we review literature on the digital storytelling movement as well as other, cross-cultural digital storytelling projects. We also summarize our own experiences of observing a digital storytelling workshop held by the Feminist Tech Exchange NGO in Cape Town to

give an account of how digital storytelling is currently practiced in South Africa.

2.1.1 *Digital storytelling's origins*

Joe Lambert and the late Dana Atchley founded the digital storytelling movement in the early to mid-1990s (Hartley & McWilliam, 2009). In response to the exclusion of 'ordinary' people's stories in broadcast media, they developed a workshop that helps everyday people unlock the stories captured in their images and video through the practice of digital storytelling (Landry & Guzdial, 2006b). The workshop's support mechanisms can be classified into two different categories, *story development* and *media literacy* support.

Story development support is provided by teaching the seven elements defining a digital story (Lambert, 2002).They are point of view, dramatic question, emotional content, voiceover, soundtrack, economy and pacing. These elements, taught to the participants by the workshop facilitator(s), are intended to help the author set the story's context for the viewer, build tension to a climax, and provide a resolution (Landry & Guzdial, 2006b). The key support element during story development is the *Story Circle*. The Story Circle consists of a number of exercises, games, and scripting, and is the place where participants encourage each other and develop and refine their own stories (Hartley & McWilliam, 2009). The workshop structure is also aimed at helping participants develop their stories. For instance, the workshop defines a timeline that the participants should follow and their progress is tracked on a whiteboard. Finally, the workshop facilitators define the form of a digital story as "three to five minute movies consisting of the author's images, video and other media coordinated with a voiceover to tell a personally meaningful story" (Landry & Guzdial, 2006b).

Media literacy support is given to the participants through a set of tutorials, which introduces the software systems the participants will use in creating their digital stories. In giving these tutorials, the facilitators focus their attention to a minimal subset of tools that are commonly needed. These tutorials give realistic and appropriate examples in context and provide the participants with the opportunity to practice their skills before working with their own media (Lambert, 2002; Landry & Guzdial, 2006b).

2.1.2 *Digital storytelling in Southeast Asia – Finding a voice*

The "Finding a Voice" research project is a multi-sited ethnographic study of, and experiment in, local participatory content creation (Tacchi, 2009). The project is located within 15 preexisting local media and ICT initiatives in India, Nepal, Sri Lanka, and Indonesia and its aims are:

> to increase understanding of how ICT can be both effective and empowering in each local context and to investigate the most effective ways of articulating information and communication networks (both social and technological) to empower poor people to communicate their "voices" within and beyond marginalized communities.
>
> —Tacchi (2009)

An interesting effect of such an approach is that it might allow those "who are living in conditions that might constitute 'poverty' to tell those who are not what this experience is like, in their own words" (Tacchi, 2009). Thus, challenging our 'expert' (Chambers, 1995) conceptions of poverty.

The strong developmental theme of the project emerges out of its partnership with various community multimedia centers (CMCs) all over Southeastern Asia. The researchers and local research assistants have adopted a digital storytelling approach that was influenced by a train-the-trainers workshop, which, in turn, was adapted from the original digital storytelling format[2] by Meadows & Kidd (2009) of the BBC Capture Wales project. The researchers further customized their digital storytelling workshop in response to the CMC members' desire to explore content that promotes social change and advocacy. The workshop format, thus, taught and emphasized journalistic techniques.

2. *(See Lambert, 2002)*

In addition, one CMC found that far more lucrative job opportunities were available for those with creative design skills, such as digital storytelling and media production, over basic computer skills, such as word processing and spreadsheets. Most of the short digital stories that were produced as part of the Finding a Voice project had some sort of development theme. While this provides us with evidence that people might want to use media to shed light on social issues and advocate their causes, we are cautions to generalize this evidence, as it is located (Suchman, 2002) within development initiatives.

2.1.3 *Digital storytelling in Brazil – One million life stories of youth*

Digital exclusion, or the highly unequal access to computers, information and communication technologies (ICTs), in Brazil affects the population as a whole and the majority of young people (Clarke, 2009) and is a cause of their marginalization in society. This has lead to the formation of the digital storytelling initiative 'Um Milhão de Histórias de Vida de Jovens' (One Million Life Stories of Youth) to enable citizen-creators to "recognize, name, and challenge their own position in society, and their relations with others and with established political and social orders". Clarke (2009) recognizes that digital storytelling, initially developed in the relatively resource-rich environments of North American educational institutions, must be improvised and adapted in order to succeed in Brazil and establish and disseminate itself at an international level.

The One Million Life Stories of Youth movement has adopted the workshop-based construction of three-minute narratives based primarily on oral performance of the digital storytelling initiative, but aim to adopt a high degree of versatility, adaptability, and flexibility in the format and practice of creating the stories. But, for the project to succeed, it has to scale beyond workshops held by the movement's founders. Hence, the key to the movement's success is the training of young "story agents", who once trained in a workshop, pass on their knowledge and create 'workshops' of their own. The hope is that this will create an ever widening, self-sustaining group and network of stories and digital storytellers. These stories are collected on a virtual platform, which was specifically designed for sustainable social development and has enabled the original story agents to group their stories together and expand those groupings as more stories are created.

No technical detail is given on how stories were produced and how story agents were able to pass on their knowledge and what equipment they used outside of the original workshop. The story agent, however, is a valuable concept, as they can be leveraged to spread digital storytelling. We believe that an easy to use mobile digital storytelling system in the hands of a story agent could be an ideal tool to collect stories and spread the practice in Brazil – and perhaps also in rural African communities.

Figure 1: The iTell digital storytelling interface.

2.2 Related systems and previous work

In this section we will look at our own previous work and other related digital storytelling systems. We review these systems and highlight aspects, methods, and findings that might help us design our own system. We also posit how usage might diverge in rural African communities.

2.2.1 *iTell*

Landry & Guzdial (2006a) developed and evaluated a personal computer digital narrative production system based on the results of their field study of a digital storytelling workshop held at the Center for Digital Storytelling (Landry & Guzdial, 2006b). They concluded that most digital media production suites are inadequate for producing simple digital narratives. This is especially true for novice digital storytellers, who usually are unfamiliar with video editing systems. Also, fundamental digital storytelling activities, as advocated by the Center for Digital Storytelling, such as story development and process management are crucially missing features of almost all existing systems. Landry & Guzdial developed the iTell system that aims to address these concerns. The interface, shown in Figure 1, is fundamentally different from digital media production suits. For instance, digital media (photos and voice-overs) is only added in the final step. The prior steps, which aim to help develop the story, are Brainstorming, Organization, and Writing. This is intended to

(a) The story creator interface.

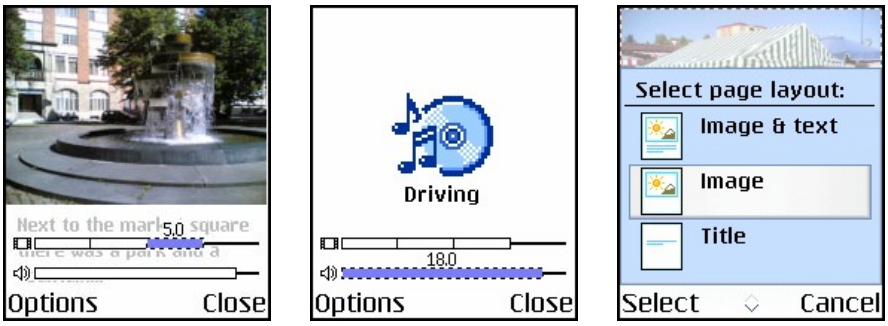
(b) The situated digital repository.

Figure 2: The story creator interface (a) and the situated digital repository (b) of the StoryBank project.

help the user to reflect on his or her story, helping them to think about story writing concepts such as focus, setting, characters, plot, and events. This novel interface is modeled after the best practices used by experts involved in teaching the "art" of digital storytelling in digital storytelling workshops and is intended to offer step-by-step instructions to guide the user through the story creation process.

2.2.2 *StoryBank*

StoryBank is a project that leverages the opportunities provided by Web 2.0 (O'Reilly, 2005), better media codecs, camera-phones, and wireless networks to bring the user-generated content revolution to a rural Indian village (Frohlich et al., 2009b). The researchers partnered with a local NGO in the village of Budikote in southern India where only roughly 50% of adults are literate. Inspired by the success of state and community radio initiatives in India, the aim of the research became to create a system that allows audio-visual media items to be created and shared by all community members, even those who can not read or write and are "naturally more reliant on verbal communication". In conjunction with the local NGO, the researchers created a community repository, shown in Figure 2b, on which audio-visual stories can be stored and accessed. These stories – modeled after the story format of the Digital Storytelling movement (Lambert, 2002) and consisting of up to two minutes of audio narrative and up to six pictures – are created using a non-textual and highly visual interface, shown in Figure 2a, on customized Nokia N80 mobile phones (Jones et al., 2009). They designed and evaluated their system in collaboration with the NGO and villagers and, thus, offer insights on how to design for non-traditional user groups. Designing appropriate icons proved particularly challenging for Rachovides et al.



(a) A page. (b) An audio object. (c) The insert page dialog.

Figure 3: Elements of the Mobile Multimedia Presentation Editor with focus on (a) a page, (b) an audio object, and (c) the insert page dialog.

(2007), as the cultural objects commonly found in Western icon sets are unfamiliar and generally not well recognized (Heukelman & Obono, 2009). However, in a dedicated workshop the community designed their own set of icons in conjunction with the field researchers. Evaluations of the StoryBank project show that it is not only possible to create and share digital stories on mobile devices, but also that this can be achieved without any textual input or output, or prior knowledge of multimedia editing tools and computers. Further, the researchers conclude that only experimentation in situ demonstrated the actual value of each design iteration (Jones et al., 2008).

2.2.3 *Mobile multimedia presentation editor*

One of the first mobile applications capable of creating digital stories is Nokia Research's Mobile Multimedia Presentation Editor (MMPE) (Jokela et al., 2008). The researchers recognized that mobile phones are evolving away from voice-centric devices towards personal multimedia devices and, hence, now have the computational power and hardware features (camera, microphone, color screen, etc) necessary to create multimedia presentations (digital stories). They argue that next to the technical feasibility, the mobile phone's ubiquity (always on, broad user base, small size) make it an attractive tool for creating and sharing digital stories. However, they also noted that designing an interface, which supports integrating several different media types (audio, visual, text) on a mobile phone in a rich manner, presents a major challenge because of the limited input and output capabilities of mobile devices. By designing, building, and evaluating such a system they show that mobile are adequate even for such complex tasks by systematically following

(a) Adding photos.

(b) Storyline shows the story's structure.

(c) Annotating a photo with audio.

Figure 4: Elements of the 'picture-driven' interface of the Mobile Digital Stories system.

a user-centered design approach throughout all stages of design. The interface, shown in Figure 3, is built upon the metaphor of a presentation editor (a), in which one adds pages (c) to a presentation. A page can include any number of image and text elements. An optional audio track can also be added (b). To synchronize the audio track with the presentation the duration of each page can be edited (a).

2.2.4 *Mobile digital stories*

In our previous work, we explored possibilities for an easy-to-use system to allow people to record their stories on mobile platforms. In this work we drew upon interaction scenarios apparent in our personal experience of storytelling and digital storytelling projects globally (Hartley & McWilliam, 2009). We based the first seven preliminary prototypes on a usage scenario in which a user combines a set of three photos with an audio record of reading from a scripted story (Reitmaier & Marsden, 2009). In the first design iteration we created low-fidelity paper prototypes suited to two different storytelling approaches, as outlined by Balabanović et al. (2000). In the 'story-driven' approach users record a narrative first and then add in photos; while, in the 'photo-driven' approach, shown in Figure 4, users add photos to a storyline and then annotate these by recording audio. We tested the paper prototypes against the usage scenario and incorporated insights of a heuristic evaluation into a second design iteration. We again developed prototypes of story-driven and photo-driven approaches in our second iteration, which we evaluated using PowerPoint with six university students. Based on evaluating the second iteration's interface elements (e.g. button place-

Figure 5: The virtual land interface of the Digital Songlines project.

ment and terminology) we created high-fidelity Flash Lite prototypes running on a cellphone. We evaluated the third iteration with eight students and, based on their preference in the context of the usage scenario, we used the photo-driven approach to create an interactive prototype. We tested this last Flash Lite prototype against Jokela et al.'s (2008) Mobile Multimedia Presentation Editor by evaluating how efficiently ten urban-based, university students, of which 8 were African, added photos to a storyline and recorded a pre-scripted story (Reitmaier & Marsden, 2009).

Few people in our evaluations had heard of digital storytelling but almost all suggested a usage scenario for our system; from "telling a friend about the club I'm currently at" to "using it with people in the AIDS clinic I volunteer at".

2.2.5 *Digital songlines*

In addition to the research carried out on mobile digital storytelling applications we draw upon research on digital storytelling projects within multicultural environments. One of these is the Digital Songlines project in Australia, which researches the development of 3D-environments to support storytelling among aboriginal communities (Wyeld et al., 2007). In conjunction with these communities Wyeld et al. have created a "virtual landscape of oral histories and mythological stories based upon the eternal sense of land and spirituality understood by the Aboriginal people." This virtual landscape, shown in Figure 5, provides more than a highly contextual setting in which stories can unfold. The virtual land is the interface through which one can embed and access information,

stories, and practices that arise from that very landscape. The project focuses on creating authentic, organic landscape to preserve indigenous Australian cultural heritage (CH), in which indigenous knowing "pauses at each rock, knows the cycles of the winds, can track underground water, find food and medicine, and uses of the land to speak its stories and keep its history."

2.3 HCI4D and HCI4D related research

In recent years, a research field in HCI called HCI4D[3] has emerged that is especially interested in opportunities surrounding cross-cultural design practice and has a special focus on HCI design for "the developing world" (Irani et al., 2010). Even though the field is still relatively young, a plethora of research papers have been published on the subject.[4] In this section we outline those that carry implications for our project, and highlight the methods and insights the researchers used and gained in carrying out their work.

3. *Human-Computer Interaction for Development*

4. *Many of these have been surveyed by Ho et al. (2009).*

2.3.1 *Cross-cultural assumptions*

One major theme in HCI4D literature is the cross-cultural nature of HCI4D projects. The difficulties in carrying out cross-cultural research are numerous and a variety of strategies have been developed to mitigate these. One main difficulty that Thomas et al. (2008) warn us of is the trap of "presuming that every culture has the same set of values and goals". Further, they ascertain that it is "crucial to continually question and explain assumptions that may be implicit in design decisions", a statement that has been reiterated by Sambasivan et al. (2009). One area where such assumptions can easily propagated into and where they are particularly harmful is the area of usability evaluations (Winschiers & Fendler, 2007). Often usability is measured according to Western standards and in metrics such as speed, efficiency, and error counts but these usability standards and metrics may be insensitive to contexts, values, and attitudes 'elsewhere' (Suchman, 2002). However, cultural differences need not define cross-cultural HCI as futile, instead it forms a "challenging but compelling design agenda for HCI researchers" and leads us to questions "how and to what extent can we preserve the local culture in technologies to create relevant and sustainable applications" (Sambasivan et al., 2009)?

2.3.2 *Values & power relations*

Irani et al. (2010) consider how power affects design activities in their formulation of postcolonial theory in computing. Postcolonial computing posits that "all design research and practice is culturally located and power laden". The reason for this can be found in the close relation of power and knowledge in the Foucauldian model of power, which states that "the goals of power and the goals of knowledge cannot be separated: in knowing we control and in controlling we know" (Gutting, 2010). A similar account, applied to the field of development, has been articulated by Chambers (1995):

> But our power in the past has overwhelmed their knowledge, hidden their analytical abilities and allowed us to assume that we know what they experience and want.

In the field of HCI4D power is exercised through our interactions with others in trying to unify our design and technical knowledge with practical and tacit knowledge of a community (Hearn et al., 2009). Hence, it is more useful to openly acknowledge these differences in knowledge and power and to place them in the center of design activities (Hearn et al., 2009; Irani et al., 2010). In fact, it would be absurd not to acknowledge diverse power relations in designing our mobile digital storytelling system, for one of the key motivations behind the digital storytelling movement was "to change the distribution of power and resources" (Lambert, 2000). In practice, considering the effect of values and power relations on design activities means to critically question how our presence, the technology we bring with us, and the language we speak might affect how people act and interact with, and even tell stories to, each other and us.

2.3.3 *Literacy, illiteracy, and orality*

Another dominant theme in HCI4D literature revolves around the issue of literacy; yet, it seems to be the one that is most often misrepresented. Drawing upon UNDP[5] (2007) statistics, Heeks (2008) summarizes the issue quite well:

> Equating the poor in developing countries with illiteracy is a common mistake. Adult literacy, even in the world's poorest countries, is still greater than 50 percent, and two-thirds of 15- to 24-year-olds are literate.

5. United Nations Development Program

Findlater et al. (2009) explore this issue in more detail and develop implications for interface design based on different kinds of literacy. For instance, and as is often the case in Africa, a person may be literate in one language but not in their mother-tongue or a person could be semiliterate. The danger lies in grouping together all low literacy users and, thus, overlooking potential benefits of text-based user interfaces for semiliterate individuals. For instance, everyday exposure to text may foster incidental learning.

The term itself – *illiteracy* – carries negative connotations by focusing on what a person cannot do and what he or she is not. Sherwani et al. (2009) argue that this can have a narrowing effect on design and that researchers and designers should instead focus on what a person is and what he or she can do well. They go on to argue that HCI4D projects that deal with illiteracy need to ground their activities in Ong's (1982) theory of *orality*. Specifically, this means to understand how information is organized, learned, and remembered in oral cultures. In addition, researchers need to respect that oral thought is additive (not hierarchical), redundant, conservative, close to the human lifeworld, and situational (not abstract) Ong (1982). The lessons carry fundamental implications for the design of user interfaces. For instance, a user interface based on hierarchical menus is unsuitable for cultures that have limited or even no understanding of hierarchies (see also Blake, 2001; Walton & Vukovic, 2003).

2.3.4 *A need for new methods*

Why do methods fall short?

HCI researchers have over the years discovered that many of the HCI methods we commonly use fall short in the developing world or in other cross-cultural contexts (Chetty & Grinter, 2007; Marsden et al., 2008; Maunder et al., 2006; Thomas et al., 2008). Techniques such as Participatory design (PD) and User-centered design (UCD), wherein the end-users become co-designers, or are placed at the center of the design process, are all predicated on the fact that the users involved have a good understanding of what digital technology can achieve (Chetty & Grinter, 2007; Marsden et al., 2008). Similarly, heuristics fall short in rural settings, as they do not incorporate any data relating to the end user and their environment (Maunder et al., 2006). Paper prototyping (Snyder, 2003), typically used to defy rigidity and determinism is also unsuitable in many rural African communities, where villagers treat

writing as special and sketching and writing materials are not available locally (Bidwell, 2009). Similarly, usability evaluations often give misleading or biased results, if we consider that usability is often defined according to the somewhat paradoxical Western standard of 'universal' usability (Winschiers & Fendler, 2007). Marsden et al. (2008) warn us that, using these techniques can have an unintended, harmful side effect and facilitate the deepening and entrenchment of technology with digitally literate users.

Methods are culturally located

Thus, it is essential to recognize the difference between HCI and HCI4D, because by using methods imbued with the cultural values of the developed world in the developing world "risks cultural collision where different values render the methods less useful at best and insensitive at worst" (Chetty & Grinter, 2007). The perceived value of constructive criticism is one such example that may differ from culture to culture. Yet, many HCI techniques rely on the willingness of users to offer criticism.

If HCI is to function in the developing world, it must "adopt new and innovative approaches which are tailored to the resources and culture in which they work" (Dray et al., 2003). These methods and approaches should be aware of socio-cultural, educational, and economic differences between designers and users and aim to understand the users in their context (Thomas et al., 2008).

In our case the contexts we will design for, and with, are rural African communities, which lead rich oral lifestyles that anchor to customary communication and power structures. However, it is exactly those contexts that "emphasize oral traditions and tangible interaction with material aspects of the world, that pose a considerable challenge for design methods and technologies grounded in current conceptual frameworks that emphasize formalism and rationalism" (Browning et al., 2008).

Methods – re-imagined

There is no textbook approach to interaction design in Africa (Bidwell & Winschiers-Theophilus, 2010), because many preconceptions we have towards user-centered and interaction design need to be unlearned (Medhi, 2007) in order to be effective in such contexts. There is no single algorithmic best practice applicable to all situations (Puri et al., 2004), but HCI4D is also not a futile endeavor as researchers have also discovered new methods and adapted existing ones in pursuit of HCI4D.

2.3.5 *Successful methods*

Pragmatic design

A questions that stands at the center of many HCI4D projects is:

> How do we design appropriate digital technology for those who do not know what digital technology is?
>
> —Marsden et al. (2008)

One way in which we can make answering that question easier is to explore pragmatic design solutions that "do not require adding more technology or infrastructure to a situation" (Marsden, 2008). Many projects in the developing world have failed because of their techno-centric approaches (Heeks, 2008; Tongia & Subrahmanian, 2006), because specifying technical requirements, e.g. how to power a PC with solar power, is an altogether different problem from what it takes to make technology meaningful (Donner et al., 2008b). Hence, it is not only essential to make the most from the infrastructures and technologies that do exist, but also to empower users and adapt technology to local needs (Marsden, 2003). One piece of technology that even those living in remote, rural communities in Africa have access to is the mobile phone (Chabossou et al., 2008). So, in exploring pragmatic and empowering design solutions we often need to look no further than the mobile phone (Marsden, 2008).

The opportunity of mobile phones

The ubiquity of the mobile phone and the increasing affordability of smart phones and feature phones for even those living in the developing world has lead to a corresponding rise in enthusiasm for projects applying mobile telephony towards economic and social development (Donner et al., 2008a) in addition to digital technology finding a foothold in parts of the world that might not even have reliable electricity supplies (Marsden et al., 2008). While mobile phones certainly can and are being used as developmental tools and play important roles in citizen media (Verclas & Mechael, 2008), individual users see the mobile not just as a symbol of economic development or productivity, but also one of self-expression, agency, and social connection (Donner, 2009). The mobile is more about "the everyday" and the social, and in that regard the developing world is no different from the developed world. So in designing applications for the mobile, it is imperative to establish rapport with potential users (Donner et al., 2008b).

The importance of field work

Few people in the field of HCI4D are more qualified and experienced than Indrani Medhi, who was recently named one of the "50 smartest people in tech" by CNN Money (2010). Medhi (2007) very poignantly summarizes her experiences of user-centered design in a development context:

> Two years ago, fresh out of graduate school, I believed in meticulously following the design processes and standard evaluation methods I had just mastered. But since then, I've discovered that more important than any particular process is the sheer time spent with the people I was designing for or with during initial investigations, during prototyping, and during usability testing. Immersion in a community allowed me to gain intuition and a sense of its culture in a way that is difficult to realize through process alone.

With few exceptions,[6] almost all HCI4D projects involve some sort of fieldwork – underlining the central role it plays in the process. It is the crucial part that helps establish contextual research and is essential for understanding potential users and establishing design requirements and goals of a system (Sambasivan et al., 2009). Yet, it is perhaps also the most difficult part of the HCI4D process. For instance, Patterson et al. (2009) address the issue of geographic and cultural distance that designers are confronted with when they arrive in the field. Despite their preparations they found themselves in remarkably different situations then they envisioned, which can result in design blind spots. Because fieldwork is the interface through which designers and users engage with each other, it is also the part that most profoundly influences the quality of the research. By this we not only mean that it influences the quality of the resulting design, but also the quality of the engagement with a particular community and avoiding the risks posed by 'development tourism' (Chambers, 1994) that can arise through brief visits by outside researchers to a particular community.

6. One exception is Putnam et al.'s (2009) compromise of using data from previous studies.

Ethnography and HCI4D

One form of field work that is particularly suited to HCI4D projects is ethnographic observation. Ethnography argues that through daily participation in everyday life, one "could come to understand what members of other cultures experienced through their actions" (Dourish, 2006). The long-term, immersive, and participatory nature of ethnography

allows it to uncover more than design implications (Dourish, 2006). Ethnography produces accounts of community member's experiences and how those experiences can be understood in terms of the interplay between members and the ethnographer. This reflexive aspect of ethnography is what sets it apart from ethnographic strategies typically used in HCI (Crabtree et al., 2009) and allows for 'felt life', user experience, and empathy to inform and influence the design beyond practical functions (Wright & McCarthy, 2008). However, ethnography alone is not necessarily best oriented towards the creation of new technologies, but can often recommend what should not be built rather than what should (Dourish, 2006).

Involvement strategies

To design new technologies and to allow those technologies to work across contexts, designers need to develop involvement strategiesthat "not only provide opportunities to render depth of detail, but also permit tangential information" (Browning et al., 2008). Ramachandran et al. (2007) have developed one such strategy for early design phases of new technologies that can make cultural differences between designer and user more apparent. By creating opportunities to observe social relations at different levels within the community, such as deploying technology artifacts in a social setting, social dynamics can be uncovered that might later on "play a significant role for technology acceptance and potential adoption". In the form of focus groups, such social settings, allow for participants to build on one another's ideas (Chetty & Grinter, 2007).

Refiguring the user

These strategies fall in line with a much a broader shift in the field of HCI4D (Irani et al., 2010) towards community-centric design (Chetty et al., 2004; Marsden et al., 2008). This shift can be seen as a logical consequence of the fact that, firstly, digital devices are rarely personal devices in the developing world (Brewer et al., 2005), but are often shared or community resources (Frohlich & Jones, 2008), and secondly, community understanding and support is critical at every stage of design, development, and deployment (Thomas et al., 2008) as well as for making that deployment sustainable (Brewer et al., 2005). One such strategy has been developed by Marsden (2008) and seeks to empower people living in the developing world to create their own solutions by developing high-level technologies that can be adapted by domain experts to local problems. This process involves identifying domain experts, who are

sensitive to local needs and contexts but are also familiar with digital technologies (Marsden et al., 2008). These domain experts, or Human Access Points (HAPS), can be seen as a proxy into the wider community, who can navigate through and translate between the different cultures and languages of the end users and designers. As such they can be seen as more than a way into a community, but "the people who should be creating the technology for the users in the first place" (Marsden et al., 2008).

The issue of appropriation

Another issue that complicates HCI4D projects is that it is much harder to predict, how a design will be adopted and adapted by a community, and to a particular context. While ethnography and other strategies involving field work help to shed light on this question, one problem that persists in many developing country contexts is that users have difficulty understanding how a new technology might fit into their daily lives, particularly if they have had little or no exposure to similar technologies (Marsden, 2009). This complicates traditional user-centered design cycles of iterative prototype refinement, as users will find it hard to give feedback on how a prototype would best fit into their daily lives based on half-formed prototypes. One strategy that is often used to overcome this problem is deploying *probes* and observing their usage (Maunder et al., 2011; Rachovides et al., 2007).

Designing with probes

In early design phases, a probe can take the form of a simple and strategically incomplete technology artifact. Such technology probes are not prototypes, but rather tools that shed light on what kinds of technologies might be interesting to design in future (Hutchinson et al., 2003). Often they are used as tangible artifacts that groups or individuals engage with and that provide a baseline around which discussions can be held (Rachovides et al., 2007; Ramachandran et al., 2007). Probes can also be used in more flexible, open-ended, and thought provoking ways – eliciting inspirational and personal responses that open design spaces (Gaver et al., 1999).

In later design phases, a probe can also take the form of a prototype that is finished to a very high standard that exhibits a high degree of flexibility (Marsden, 2009). The flexibility of such probes allows people and communities to adopt and adapt the technology to their particular needs and contexts, and allows designers to observe how usage brings

technology into being as well as informing the design of future design iterations or entirely new systems. Embracing uncertainty and building it into a design in the form of flexibility, circumvents the need to predict usage a priori and allows us to consider "unanticipated social uses of [an] application, as well as the ways in which social forces and context will enable and constrain its use" (Donner, 2009).

2.4 Concluding remarks

In this chapter, we have explored how digital storytelling initiatives globally spread the practice through workshops, in which participants are taught how to develop a story and transform it into a digital story using video editing software. We also seen that the infrastructure required to hosts these workshops is not always present in rural communities, especially in the developing world. In our observations of such a workshop, we have seen first hand how inexperienced participants had great difficulty using computers and simple video editing software. In exploring pragmatic design solutions, which make use of already present technologies, we have looked at how mobiles support digital storytelling. Discussions on related projects lead us to conclude that mobiles are technically feasible storytelling devices that can be made accessible, even to those who cannot read or write, through usability engineering. But, we have also seen that those very systems are modeled on top of different media (Jokela et al., 2008), are suited to fit the story format of the digital storytelling movement (Jones et al., 2008), or make heavy use of text in their interfaces (Jokela et al., 2008; Reitmaier & Marsden, 2009). One common theme of the HCI4D related literature we reviewed is that the different context, culture, and values of developing communities can often render the technological systems and the methods used to design them ineffective.

The discussion presented in this chapter leads us to conclude that if digital storytelling is to be relevant in rural African communities, a mobile system is needed that is sensitive to their unique needs and context, and that can accommodate their communication practices and storytelling traditions. To design such a system, a sensitive, reflective approach is needed that first aims to understand communication practices in these communities and which integrates these insights into a system suited to their needs, customs, and culture. We need to reinterpret digital storytelling, from its Western origins, into rural African communities and design a mobile digital storytelling system that embodies a rural African

interpretation of digital storytelling. The following chapter outlines the methodology and methods we used to conduct our research and the research questions we aim to answer through designing a mobile digital storytelling system suited to the needs and functions of rural African communities.

3 METHODOLOGY

Contents

In the previous chapters, we have explored the rich oral traditions that play an important part in everyday life in communities all over Africa. We use this "primacy of the human voice" (Peek & Yankah, 2004) to contend that these communities would stand to benefit from a digital storytelling system that suits their needs – especially if we consider that the only infrastructure required is the already present and ubiquitous mobile phone. We have, however, also seen how difficult it is to design such systems when the methods we commonly use in HCI fall short in cross-cultural contexts. In this chapter, we cautiously formulate our methodology as the shortcomings described in the previous chapter lead us to believe that common methodologies might also fall short in such contexts.

3.1 Significance of research

We have shown that digital storytelling on mobile devices is feasible (see Frohlich et al., 2009a; Jokela et al., 2008) and, in our own previous work, explored how different approaches[1] can be taken to record digital stories on mobile devices (Reitmaier & Marsden, 2009). But the design

1. *See section 2.2.4 for an explanation of story-driven and photo-driven approaches.*

of such systems and the methods used to design them are also located (Suchman, 2002) in Western culture: heavily influenced by our use of the written word, mediated forms of communication, and our secondary orality (Ong, 1982).

To design a mobile digital storytelling system that suits the needs and functions of rural African communities, we need to look beyond the technical challenges and constraints placed by mobile phones; beyond the challenges of designing flexible and meaningful interactions and interfaces across cultures, and beyond providing those communities with a digital voice. First and foremost we must let community members take ownership of and interpret their own forms of digital storytelling that are compatible with their orality and their ways of doing and saying (Bidwell & Hardy, 2009). It is only after we appreciate and achieve this crucial first step that we can begin to design meaningful interactions and interfaces across cultures and languages, deal with the technical challenges posed by programming mobile devices, and start to study what digital voice might emerge out of such a system. Herein lies the difficulty and significance of our research.

3.2 Designing design

We open our research to the question of design to engage in an interaction of understanding and creation (Winograd & Flores, 1986). But, this process does not begin with 'designing' sketches or prototypes. Instead, we see design as a more fundamental process that looks at how society engenders inventions. Design, as we see it, starts with appreciating the primacy of design and designing appropriate research questions; for the questions we ask and how we ask them can often already define the range of possible answers. Likewise, we must design an appropriate methodology that is sensitive to these questions while restricting bias.

Yet, to claim that these activities form a linear process – moving from questions, to methodology and methods, to answers – is a fallacy. For, design takes place in the *interaction* of understanding and creation: as we 'create' research questions, we understand; as we create a methodology, we understand; and as we create sketches and prototypes and engage others in our design activities, we again further our understanding. This necessarily implies that our understanding is and always will be unfinalized and with it our questions, perspectives, and any prototype or sketch of our system.

3.2.1 *The question of design*

Because of these recursive influences, we take the question of design – in this fundamental sense – and set it as our preliminary research question:

> How can we *design* digital storytelling for rural African communities?

Because any new technologies are always developed over a background of tacit knowledge and understanding of human nature, this broad question can help us navigate design's complex terrain. But, the use of technology also leads to fundamental changes in what we do, how we do it, and ultimately in what it is to be human (Winograd & Flores, 1986). Whether this shift is good or bad can only be understood in hindsight. So, by designing digital storytelling we need to confront these issues directly: we need to tap into the users' tacit knowledge and understanding; we need to obsess about what digital storytelling could do for rural African communities by enfranchising their voice; but, we also need to continually and critically question ourselves if we should. Design is not about color and typography. It is about humanity and what it means to be human.

Thus, the question of design principally guides our research and helps us structure our activities – always with the goal of striving for higher levels of understanding. In turn, this higher understanding – achieved through design and research – allows us to formulate more focused and appropriate research questions.[2]

2. In section 3.4 we formulate more concrete research questions.

3.2.2 *Shaping a methodology*

Here we outline the difficulties we had developing a methodology and explain how we could only develop and embrace our methodology *through* conducting our research. While we formulate a clear methodology below,[3] developing our methodology and more importantly embracing it was an ongoing process that was far from trivial. Our methodology is shaped by our previous experiences and the new perspectives we gain through research. These experiences, in turn, lead us to develop and, over time, embrace new methodologies.

3. See section 3.3.

Previous experiences

In our previous work (see Reitmaier & Marsden, 2009) we adopted a technologically inspired[4] – by bringing together digital storytelling and

4. See Beale (2006).

mobile phones – and user-centered approach to interaction design.[5] We embraced this iterative, user-centered approach with its four basic activities: (1) establishing needs, (2) developing and (3) building alternative designs, and (4) evaluating those designs (Sharp et al., 2007, p. 428). To be sure, this simple, proven, and algorithmic approach – where user feedback and empirical measurement demonstrated our design's strengths, weaknesses, and 'worth' and progressed it through four iterations – has demonstrably improved the interfaces we developed. But, most of the observations and subsequent improvements we made were at the level of the interface. These included improving affordances and terminology while overcoming the constraints of mobile phones. This approach, however, required problems to be formalized and expressed in terms of tasks, goals, and efficiency (Harrison et al., 2007). This obscured what was happening around or even beyond the interface from our observations.

5. *See Sharp et al. (2007) and Jones & Marsden (2006).*

New perspectives

Our current research touches upon subject areas well beyond computer science. The simple, human nature of digital and non-digital storytelling coupled with the cross-cultural character of our research make our enquiries into HCI also a study of culture, society, and communication. Our research is as much about what is happening around and beyond the interface as it is about the interactions at the site of the interface. So the first crucial step of our research was to collaborate with Nicola Bidwell, a designer-ethnographer who uses ethnographic, participatory, and phenomenological methodologies and perspectives in indigenous Australian and rural African environments.

Especially in early design phases, we were exposed to unfamiliar methodologies such as ethnography and dialogical design by collaborating with Nicola Bidwell. These methodologies are better suited to the study of personal experiences, meaning making, and felt life (Wright & McCarthy, 2005) – areas which were marginalized by our previous approach, but perhaps carry more relevance for storytelling systems than speed and efficiency. But, adopting such methodologies is no simple feat, because they are also grounded in different *epistemologies* such as phenomenology and hermeneutics that embrace – rather than avoid – subjective and reflexive reasoning.

The problem of epistemology

The methodologies commonly taught and used in computer science and psychology are built upon empirical or positivist epistemologies

that have in practice become second nature and assumed (Winograd & Flores, 1986). The trouble is not only that these assumptions go unquestioned, but they also obscure the important relationship between methodologies and their underlying epistemologies. While adopting methodologies that are built upon familiar epistemologies is often only a matter of implementing their set of methods, the difficulty – especially for computer scientists and psychologists – of adopting fundamentally different methodologies is that we must also subscribe to their underlying epistemologies. These are often grounded in unfamiliar conceptions. The multi-disciplinary field of HCI has often overlooked this difficult yet crucial step. In turn, this has led the field to domesticate many methods while alienating them from their methodologies and epistemologies. Boehner et al. (2007); Crabtree et al. (2009); Dourish (2006); Gaver et al. (2004); and many other researchers are troubled by these developments.

In conducting our research and collaborating with Nicola Bidwell, we placed our emphasis on *inter*-disciplinarity. Rather than just informing the design of our system with the data and insights Nicola Bidwell 'gathered' in-situ, we also tried to integrate and appropriate her perspectives and methodologies. But, the shift in perspective this required – from that of an objective and detached third-person scientist to a subjective, first-person perspective – did not come easy or natural to us, as our formal training (computer science and psychology) make us more comfortable with the controlled laboratory experiment than in the outside world.

The discourse of our project is certainly open to philosophical as well as scientific exploration, but ultimately our aim is not to take a philosophical stance. Rather, we wish to show that there are many ways to conduct research and that we need to be cautious in choosing, because the questions we ask and how we go about answering them often already define the range of possible answers.

3.3 Research methodology

In this section, we outline the methodology we developed through conducting our research and locate our research within the field of HCI. We highlight the concepts and perspectives we used and adopted throughout our research. We broadly classify these as: *collaborating*, *interpreting*, *reflecting*, *experiencing*, *probing*, and *locating*.

3.3.1 *Collaborating*

Deciding to collaborate with Nicola Bidwell and different NGOs not only significantly impacts our research, but enables our research in the first place. While we are eager to engage in field work of our own, collaborating with Nicola Bidwell allows us to achieve results of a much higher quality than we could achieve on our own. Foremost the *quality*[6] of her engagement in rural African communities far surpasses what we can achieve on our own – not least because of time and cost constraints of our Master's projects and our own limited field work experience. Discussing our project with other researchers in fields such as Computer Science, New Media Studies, Linguistics, Anthropology, and Communication can provide us with stimulating new perspectives to integrate into our research and design. And finally, collaborating with NGOs – trusted and accepted organizations who play an instrumental part in Africa's development agenda – can not only provide us with access to developing communities but also with valuable information and expertise about those communities (Gitau & Marsden, 2009).

6. See Chambers (1995) for a discussion of the dangers of 'development tourism.'

3.3.2 *Interpreting*

One issue that is encountered again and again in design is that of *interpretation*. It is a process that all people who participate in design activities and who use prototypes or final systems go through. In our case, participants will have to interpret digital storytelling and assign meaning to it. Because of the low technology ambience of many rural communities all over Africa, most new technologies are by nature 'different' and, thus, require interpretation. We, as people living in areas of high technology ambience, can readily reach an initial understanding of what digital storytelling is or could mean to us.[7] To develop such an understanding we might draw upon our experiences of PowerPoint presentations, photo slideshows, dictaphones, and experiences with similar technologies. Without such priming experiences – as is the case in rural African communities – interpreting digital storytelling might not be quite so instantaneous or easy. Our goal is, thus, to provide ample opportunities for such interpretations to take place. For these reasons, we place the issue of interpretation at the center of our design process.

7. For example, Reitmaier & Marsden's (2009) participants had no trouble coming up with their own digital storytelling scenarios.

The centrality of interpretation

To be sure, it is difficult to conceive of interaction without interpretation, "if we understand interpretation as the process by which users, nonusers, and designers come to assign meaning to the structures and functions of computational systems" (Sengers & Gaver, 2006). Interpretation is a flexible concept that can operate on, or assign meaning to, different levels. Lower levels of interpretation deal with issues such as what a button press might do. Higher levels of interpretation, on the other hand, deal with less palpable issues such as what relevance does a technology have for ongoing life. These levels of interpretation also fall in line with our earlier observations of distinguishing the actions and interactions at the site of the interface from those that are taking place beyond the interface. Different levels of interpretation can also help us distinguish between usability and experience of the systems and prototypes that we seek to build.

Designing for low-level interpretations

At the site of the interface we are concerned with designing, prototyping, and evaluating an effective and easy-to-use digital storytelling system. We are influenced by Norman's (1988) framework for designing intelligible devices and apply aspects of his framework, such as implementing appropriate constraints and affordances, within Sharp et al.'s (2007) interaction design process, which has four main activities:

Understanding users – gaining an insight into and appreciating people's strengths, weaknesses, values, lives, communities, and the things they do and use.

Developing prototypes – representing a proposed interaction design in such a way that it can be demonstrated, altered, and discussed.

Evaluation – using evaluation techniques to identify the strengths and weaknesses of a design.

Iterative refinement – applying the above activities to strive for a higher understanding and better interaction design with each iteration.

We apply this iterative approach because we have seen first hand (see Reitmaier & Marsden, 2009) how it can demonstrably improve an interface. Yet, we also realize that this process needs to function

across cultures and harmonize with design activities that look beyond the interface. So, compromises and creative interpretations of these activities may become necessary.

Designing for high-level interpretations and hermeneutics

To understand how people interpret and give meaning to our activities and designs on a higher level, we turn to *hermeneutics* (the study of interpretation). Interpretation, as understood by *Hans-Georg Gadamer*, is an interaction between the *horizon* provided by a text or situation and the horizon that the interpreter brings to it (Malpas, 2009). In this way, any individual, in understanding his or her world, is continually involved in activities of interpretation (Winograd & Flores, 1986). If we accept that the horizon brought to a situation by an individual is rooted in his or her tradition and understanding of the world, then interpretation is based on prejudice or *pre-understanding* (Winograd & Flores, 1986). In essence, understanding is based on what an individual already knows, and what he or she already knows comes from being able to understand. Applied to the usage of technology this implies that, the meaning of a technology is contextual; it depends on the moment of interpretation (usage) and the horizon brought to it by the interpreter (user) at the time and place of interpretation.

Rather than fixating on a single, 'correct' interpretation, Sengers & Gaver (2006) argue that it is better to stay open to interpretation and encourage people to "appropriate and reinterpret systems to produce their own uses and meanings." Designers can encourage open interpretations, by clearly specifying usability, but leaving interpretation of use, meaning, and purpose for users to decide. This shift of interpretative control from designers to users, however, requires us to refigure our view of users not as passive recipients of technology, but as actors who are engaged in a sense making process (Salovaara & Tamminen, 2009) and who create the circumstances, contexts, and consequences of technology use (Dourish, 2006).

Interpreting-in-action

As Polanyi (1966, p. 4) so succinctly puts it, "we know more than we can tell." Referring to the tacit nature of both intellectual and practical knowledge, Polanyi goes on to explain that "experience [is] always in terms of the world to which we are attending from our bodies" (1966, p. 15). In fact, from infancy to adulthood "humans learn about the world and its properties by interacting within it" (Klemmer et al., 2006).

These excerpts illustrate that in order to properly interpret and give meaning to a technology, users need to be able to experience a real world manifestation of it, not just an abstract concept.

This is especially important for the design of mobile systems, where

> the most important aspect of the design process is to provide users with the real usage context … Users need to be able to touch the [mobile's] buttons and see software that is working, or at least feels like it is working.
>
> —Kangas & Kinnunen (2005)

The usage context, which Kangas & Kinnunen are referring to, is the prototype. Prototypes are used to demonstrate and discuss ideas and can convey new concepts to users. They are an effective way to develop and test out ideas and, in addition, encourage reflection in design (Sharp et al., 2007). This is true for both designers[8] and users. User needs also evolve with the artifact (Kangas & Kinnunen, 2005), so developing and presenting prototypes to users can help (re)assess user needs, as well as demonstrate and test the feasibility of ideas and features.

8. Klemmer et al. (2006) provide a more detailed discussion on how designers think through prototyping.

Thus, developing and refining prototypes of our system serves two purposes. It helps designers to work through, rather than just think through, design spaces. In the same way, the physicality of the prototype empowers and stimulates users to develop their own interpretation of systems, not just through thinking, but through doing.

Evaluation as interpretation

Current practice in HCI advocates usability evaluation as a critical part of every design process. But, common evaluation approaches are based on testing against prior evaluation criteria, which correspond to the designer's – and not necessarily the user's – anticipated interpretation of a system (Sengers & Gaver, 2006). These evaluation criteria are often cast in terms of a single quantitative measure, such as speed or error rate, that obscure important properties that should also be captured and discussed. Greenberg & Buxton (2008) have called into question the post-positivist stance that is currently prevalent in usability evaluation. They argue that evaluation should not only "be open to other non-empirical methods," but in general:

> the choice of evaluation methodology – if any – must arise from and be appropriate for the actual problem or research question under consideration.
>
> —Greenberg & Buxton (2008)

We stray from common HCI practice and follow Greenberg & Buxton's (2008) main message not only because the metrics and calculi HCI commonly uses to evaluate usability are insensitive and ineffective in African contexts (see Winschiers & Fendler, 2007), but also to avoid constraining interpretation of our designs and future iterations based off of those designs. Taking into account the low computer literacy of our intended user group, a usability evaluation applied in early design phases could potentially quash our design instead of offering meaningful critique. We do not intend this veering from common practice to be self serving or 'weak science' (Greenberg & Buxton, 2008). Rather, if we ask ourselves "how can we create what could become culturally significant systems if we demand that the system be validated before a culture is formed around it" (Greenberg & Buxton, 2008), it is not hard to see that a usability evaluation could very well deliver meaningless results.

Instead, evaluating our mobile digital storytelling system in a rural African context might best be accomplished by flexibly gathering assessments from a diverse group of interpreters. Such an evaluation shifts focus from a low-level point of view towards a broader, more layered view of how the system is used, the roles it plays, and the cultural implications it suggests (Sengers & Gaver, 2006). But evaluating and designing for interpretative flexibility "does not abdicate the designer from responsibility for the eventual success of the system" (Sengers & Gaver, 2006). If our system is to be successful, it needs to be compatible with the ways of doing and saying of rural African communities. This requires that community members are able to use – or learn how to use – our system. In addition, and just as important, they need to be able to use our system in ways that they deem sensible and appropriate, even if these forms of usage are unexpected. Unintended, differing or conflicting user interpretations should not caused by bad design (i.e. poor usability), but should be the result of good design (i.e. interpretative flexibility).

Leaving room for interpretation

We realize that in responding to the question of design and interpreting digital storytelling with communities that are located on the periphery of HCI's focus, we need to be aware of, and more importantly reflect on, the conscious and unconscious values that are embedded in design practice and in the systems that this practice builds. A *reflective* approach to design can help mitigate these issues, as we are particularly anxious because by building a digital storytelling system we can only change, and not represent, storytelling practice. This is necessarily so, because the

problem of design is to "create an understanding of the way we might want the world to be" rather than to seek to describe "the way the world is" (Wright & McCarthy, 2005). Hence, we pursue a co-constructed interpretation of digital storytelling between us, as designers, and users. But, when there is so much benefit in the physical world, Klemmer et al. (2006) warn us that we "should take great care before unreflectively replacing it."

3.3.3 *Reflecting*

Reflective design is grounded in critical theory, which argues that "our everyday values, practices, perspectives, and sense of agency and self are strongly shaped by forces and agendas of which we are normally unaware, such as the politics of race, gender, and economics" (Sengers et al., 2005). Through critical reflection we gain awareness of such forces. This helps us not only to uncover value clashes between designers and users, but also the values implicitly embedded in our methods.[9] Sengers et al. (2005) have put forth a set of core principles of reflective design. We introduce and expand on these to contextualize reflective design within HCI4D, our project, and our overall methodology.

9. *See section 2.3 for a more detailed discussion of this problem.*

Uncovering limitations in design practice

Inspired by Agre's (1997) critical technical practice (CTP), reflective design is used to identify unconscious values and assumptions that are built into "the very way we conceive of design." Our project is located at the margins of HCI not only because of our 'non-traditional' user group but also because of our focus on storytelling and supporting social practices rather than on computation. Thus, the very nature of our project is already making a reflective statement by bringing marginalized user groups and practices to the center of our attention. A reflective approach to design is, thus, well suited to our project, as we expect our values and perspectives to clash – providing many opportunities for reflection in the process. Applying a reflective design approach in a more traditional project, however, may not provide these opportunities as readily. In those projects many values are shared between designers and users and, thus, are harder to uncover. While re-imagining our methods within the target culture provides a challenging design agenda (Marsden, 2010), it also provides our research with the opportunities to debate which activities and values, whether implicit or explicit, HCI practitioners should support.

Acknowledging the role of self

We can use reflection to acknowledge, and reflect on, our own biases and limitations – not just those of the field as a whole. Critical theory argues that "all our personal experiences are informed by unconscious influences." In the previous sections we have already summarized our previous projects and discussed how they and our formal training have profoundly affected our methodology, epistemology, and world-view. But acknowledging the role of self goes further than exposing our bias and "emancipating ourselves from some of the limits they place on our thinking" (Winograd & Flores, 1986). Particularly when we turn our attention from usability towards experience, the role we play in the design process becomes evermore important and inseparable from it. So rather then seeking to become a user or develop an 'objective' account of a user's experience, we seek to understand what it feels like to be another person and what their situation is like from their experience (Wright & McCarthy, 2008). This is necessary because "we can never step out of an experience and look at it in a detached way" (McCarthy & Wright, 2004). Instead we seek to engage in an empathic relationship with users, where we, as designers, respond to what we see as the user's world from our own perspective.

Supporting skepticism and reinterpretation

Technology is not inherently value-blind; it optimizes for different points of view and makes differing assumptions about "optimal, assumed, and allowed uses and users" (Sengers et al., 2005). While supporting and optimizing for user values can help mitigate these issues, a reflective design should also empower users to reject or re-appropriate a technology for alternate ends.

Reflecting-in-action

There is a tendency to see reflection as a post-hoc, intellectual activity that is carried out separate from action. But, if we consider that our interpretation of an observation or situation is an interaction between the *horizon* provided by the situation and the horizon that we bring to the situation,[10] it becomes clear that critical reflection is most effective when it is folded back into our activities. Thus we should "not design for reflection as a stand-alone activity but as one component of a holistic experience which also includes ongoing activity" (Sengers et al., 2005). Over time our sense of a situation or of an experience is "enriched by

10. See section 3.3.2 for a more detailed discussion of hermeneutics.

reflection", by thinking and talking about it (McCarthy & Wright, 2004, p. 117).

3.3.4 *Experiencing*

Reflective design puts forth a complex set of issues that, along with the importance of *experience*, which we highlighted earlier, can be difficult to navigate. Our design activities, understanding, and interpretations are reflective, reflexive, unfinalized, and elusive. We turn to the metaphor of *dialogue* to help us navigate these daunting issues and design for experience. Wright & McCarthy (2005) argue that a key feature of their approach to experience is that "how an individual makes sense of a situation, interaction, episode or artifact is as much about what the individual brings to the experience as it is about what the designer puts there." In this way, sense making is similar to Gadamer's hermeneutic horizon. This implies that we cannot design an experience, because experience cannot be reduced to fundamental elements. Experience resides in relations between self and others and between self and objects (Wright et al., 2003). By studying these relations, we can, however, design *for* an experience. Drawing upon the work of the philosopher Mikhail Bakhtin, Wright & McCarthy (2005) argue that in order to "engage with others' experiences in a way that can bring about real change one must enter into dialogue with those others" and "at the heart of successful dialogue is something [...] called creative understanding."

Creative understanding

Both designers and users have a *surplus* of meaning or expertise. Users are 'their own experts' in their activities (Wright & McCarthy, 2005), or, in our case, users are their own experts in storytelling. While designers may not have the same level of expertise in the user's domain, they are 'their own experts' in design and seeing possible applications of technology. These surpluses are, however, often tacit. Thus, if we come into dialogue with another person or culture, we can see meaning and potential that is invisible to them, and vice versa. The potential for creative understanding is then achieved through dialogue when we uncover and integrate our 'design surplus' with the users' 'activity surplus.' Such a dialogue, however, also requires a certain attitude from both designers and users.

Addressive surplus

To unleash the potential of designer and user surpluses and engage in creative understanding requires something that Bakhtin refers to as *addressive surplus*. "This is an attitude towards each other that allows them to ask the kinds of questions that provide the stimulus for new understandings: The addressive surplus is the surplus of the good listener" (Wright & McCarthy, 2005). Addressive surplus is an active (not a duplicating) understanding, where the listener can use his/her outsider role to ask the right sort of questions without trying to finalize or define the other.

Design empathy

In designing our mobile digital storytelling system we aim to enrich experience and promote a sense of place through technology, not least because place and experience play central roles in the stories that we tell. But to do so, we "need to engage [with people] at the level of their personhood, not just treat them as anonymous and equivalent units" (McCarthy & Wright, 2005).[11] To begin to understand what people experience in their lived and felt life involves *empathy*. It involves an understanding of what it feels like to be another person and what their situation is like from their experience (Wright & McCarthy, 2008). In such an empathic relationship the designer responds to what they see as the user's world from their own perspective as designers. But empathy and an understanding of experience can not simply be created; they must be developed through creative understanding and dialogue (McCarthy & Wright, 2005).

11. This trouble was later in our research expressed by villagers who felt outsiders did not articulate or understand their identities.

Design-in-use and creative responses

Just as reflection and interpretation are only effective *in-action*, so too is experience. If we view design dialogically, new technology is just a temporary finalization that, designed and deployed with addressive surplus, draws creative responses from users. *Design-in-use*, then, is a process of mutual learning mediated by artifacts in ongoing dialogue between designers and users (Béguin, 2003). In turn, this higher understanding can be leverage to design 'better' finalizations. Wright & McCarthy (2005) note that the novel ways that users make use of technology "can be a source of genuine surprise to designers and delight to both designers and users" and can, thus, also help foster an empathetic relationship (see McCarthy & Wright, 2005).

3.3.5 *Probing*

Contemporary HCI has over the years shifted[12] its focus beyond the workplace towards our homes, everyday lives, and culture (Bødker, 2006). A burgeoning interest for new methods of engagement has accompanied this shift. One of the most prominent and widely used of these is the *probe*. Probes were initially developed by Gaver et al. (1999) and intend to provide inspirational glimpses of communities. They contain open-ended, provocative, and oblique tasks that over time deliver fragmentary returns. In turn, the fragmentary nature of the returns – offering clues, not comprehensive information – requires designers to *subjectively* interpret the responses and, thus, inspire new design spaces.

Today the probe is an umbrella term, and it has been interpreted broadly. Its rapid uptake within HCI can be attributed to its flexibility and adaptability. Probes have also been deployed in cross-cultural and HCI4D projects.[13] They are a common, yet, elusive concept that in practice are used as well as abused[14] by designers and researchers (Boehner et al., 2007). Here we explore how we can effectively use probes and how the approach fits into our methodology.

12. See section 3.3.6 for a more detailed discussion.

13. See section 2.3.4 for a discussion on how probes have been used in HCI4D projects.

14. Gaver et al. (2004) have expressed concern about how probes have been adopted.

The issue with probing

Boehner et al. (2007) warn us that probes are a site at which questions of relevance, validity, and politics of participation are articulated. If a probing approach should fit into our methodology, we need to confront these issues directly and *reflect* on how probes affect our research agenda. As we shall explain in the coming chapters the original probe approach is unsuitable for our purposes. Therefore, we need to make decisions about which aspects of the original approach are essential and which we can alter, leave out, or append. Only by making these decisions explicit can we argue the validity of our probe adaptations.

Probes as participation

> They're a way for us to get to know you better, and for you to get to know us.
>
> —Gaver & Dunne (1999)

Probes are a design-oriented technique for researchers to acquire inspiration glimpses of communities targeted for design. They "give participants a voice to interpret and explain their own practices" (Vetere et al., 2006). Thus, probes give a license to participate – both explicitly and implicitly – in design activities. They have been deployed on their own and

in participatory design workshops. For instance, Amin et al. (2005) presented probes – colorful and creative materials – to the participants of their design workshops to get "acquainted with their life style, with the environment they live in and with their experiences."

But probes have also been critiqued as not being participatory enough (Boehner et al., 2007) or being a poor substitute for ethnographic inquiry (Dourish, 2006). These critiques, however, are directed more towards how HCI has *interpreted* the probe and its results rather than how their creators imagine probes.

Probes as interpretation

One of the most salient differences between probes and many of their adaptations is how the issue of interpretation is handled. Broadly speaking, interpretation can be seen as *opening* or *closing*. When interpretation is viewed as opening, it is used to catch glimpses of particular lives, spark design inspiration, and open up a variety of possibilities. Viewed this way, the goal of the probe has similarity to that of ethnography – to stage encounters between cultures that require reflexive analysis (Boehner et al., 2007). When, on the other hand, interpretation is view as closing, it is used to delimit the design space, gather requirements, find the 'right' answer, and fix the true meaning of what users said. These different categories of interpretation also define the role of the researcher as *responding to what was expressed* by the researched or *ascertaining facts about* them (Boehner et al., 2007). The categories of interpretation are also, respectively, grounded in hermeneutic and positivist epistemologies.

Probes as dialogue

> We thought of the proposals as our turn in a conversation that had started with the probes and continued with the elders' responses.
>
> —Gaver & Dunne (1999)

The above quote illustrates that probes are not just some material package, but personally and carefully crafted packages through which designers also reveal themselves, with the goal of engaging with users in dialogue. It also shows us that the designs gained from a probing approach should not be viewed as final, but part of an ongoing conversation. Thus, the nature and lifespan of the approach fits well with our dialogical view of experience. The creative responses of the participants

who use probes, or prototypes of a resulting system, also help support an empathetic engagement between designers and users (see Mattelmäki & Battarbee, 2002; Wright & McCarthy, 2008).

Probes as rich explanations

> Most of the time the relationships between Probes and proposals are … complex and difficult to trace.
>
> —Gaver et al. (2004)

The reason for this lies buried in the subjective nature of probes. Moving from probes to prototypes does not just 'happen' (Wolf et al., 2006). It is often a subjective process where emotion and intuition play their parts – aspects that are incompatible with typical HCI usage of design (Wolf et al., 2006). Thus, this difficult relationship has been underplayed or omitted in many accounts of probe adaptations (Boehner et al., 2007). But this process should precisely not be underplayed, feared, or considered 'black art' (Wolf et al., 2006). It should be embraced. A crucial part of the approach is to develop an account of how probes are designed; how they are introduced and deployed; and how designers move from probes to design proposals and onward.

Probes as technology

One of the most common probe adaptation is the *technology probe*. "Technology probes are a particular type of probe that combine the social science goal of collecting information about the use and the users of the technology in a real-world setting, the engineering goal of field-testing the technology, and the design goal of inspiring users and designers to think of new kinds of technology to support their needs and desires" (Hutchinson et al., 2003). But these goals do not necessarily fall in line with each other perfectly. For instance, a compromise is necessary between the competing goals of not influencing user behavior and collecting data in-situ. It is also helpful to think of technology probes not as prototypes, but rather tools that shed light on what kinds of technologies might be interesting to design in future. They should be simple and flexible artifacts that are introduced in early design phases to collect data about users and help designers generate ideas for new technology.

3.3.6 *Locating*

> Design success rests on the extent and efficacy of one's analysis of specific environments of devices and working practices, finding a place for one's own technology within them.
>
> —Suchman (2002)

One important question that we still need to ask before embarking on our research is: *what is mobile digital storytelling?* Discussing this question holds the key to locating our research within HCI and uncovering the relations and interactions between users, interfaces, researchers, and setting. This question – viewed from different perspectives – has many answers: for the *programmer*, mobile digital storytelling is a collection of data structures and algorithms; for the *interaction designer*, it is an interface to synchronize audio with photos; and for the *user*, it is a tool to create and modify linguistic structures that play an important part in human communication. But does this give a complete answer to the question? Can we view the act of creating a digital story as an independent phenomenon? Can such a device be created and studied in isolation?

We, as many others before us,[15] argue that this is not the case. The person who uses mobile digital storytelling should not have to care about how it is programmed, what mental models and affordances the interface makes use of, or even that it is a communication instrument. The person using mobile digital storytelling is not 'using' the instrument per se, but rather 'acting through it'. Users only focus on the interface itself when they are unfamiliar or in times of trouble; otherwise, the interface is a connective medium (Suchman, 2007, p. 279). So, users of the system are not creating digital stories, but *telling* stories. They are being funny, creative, spontaneous, introspective, or serious. And there is a complex social network in which these activities make sense, and hence we "cannot understand [the] technology without having a functional understanding of how it is used" (Winograd & Flores, 1986). We need to focus on whole environments. And we need to uncover "what people really do in them and how people coordinate activity in them" (Hollan et al., 2000). Thus, our research is located in rural African communities, in their culture, and in their 'ways of doing and saying' (Bidwell, 2009).

15. *See (Hutchins, 1995; Suchman, 2007; Winograd & Flores, 1986)*

Locating stories

The stories that people tell and how they tell them are embedded in their locale. They can often only be understood in their relations with real-world situations. By this we not only refer to *indexical expressions*,[16] but in general "every occasion of human communication is embedded in, and makes use of, an unarticulated background of experiences and circumstances" (Suchman, 2007, p. 178). So, while the photos of digital stories might preserve some of the indexical meaning that is lost in pure audio recordings, we still cannot afford to look at these and other aspects of storytelling in isolation.[17] Stories may be stored as text, audio, and photos on computers, but for the storyteller – crafting or telling a story – they are not a computational phenomenon, but a social one. The stories that people tell are shaped by culture and rituals, influenced by setting and emotion, and appreciated and interpreted by an audience.[18]

16. *i.e. contextual expressions such as* 'that girl over there' *or* 'her'

17. *See (Winograd & Flores, 1986)*

18. *See (Finnegan, 2007; Kaschula, 2002) and section 4.1.4 for a more detailed account of storytelling in Africa.*

Locating mobiles

There is no doubt that mobile phones are transforming rural, developing communities all over the world,[19] simply by giving technology, and also computation, a foothold in parts of the world that might not even have reliable electricity supplies (Marsden et al., 2008). But the devices are also changing the very nature of computation. Unlike personal computers in community telecenters or internet cafés, the mobile is in the user's pocket. The mobile is embedded in the user's social and physical surroundings. It is a shared device that gets passed around to nearby friends or family members during a phone call. And so ultimately, mobiles are intimately linked to their owners and their surroundings.

19. *See (Donner, 2009)*

Locating users

Just like the mobiles that they use and the stories that they tell, users of mobile digital storytelling software are situated within their surroundings. These surroundings, and also the very nature of digital story *telling* software, are very different from the relatively stable and well-defined contexts – single user interacting with productivity software running on a PC using a keyboard and mouse – that HCI has historically focused on (Kaye, 2007). Mobile digital storytelling reaches into a complex world of people, setting, and culture, so we need to refigure the user not as an information processor, but as a *situated actor* (Suchman, 2007). Situated actors respond to the setting in which action unfolds. They come to understand the physical and social reality of their world by interact-

ing, interpreting, and experiencing it through their bodies (Klemmer et al., 2006). These processes, which are influenced by intuition, culture, and 'thinking-through-doing', contribute to the tacit surpluses of users' knowledge.[20]

20. See section 3.3.4 for a more detailed discussion of design and activity surpluses.

If we accept the existence of situated knowledge, we must understand the *context* that strongly influences and perhaps even constructs it. This requires us to see context not as a stable construct that can be sensed by devices[21] or abstracted in generalized theories and models, but as a relational property that holds between individuals, objects, and activities (Dourish, 2004). This is the critique many social scientists (e.g. Hutchins, 1995; Suchman, 2007) espouse towards positivist accounts of human social action. Context, as social scientists argue, is fundamentally unspecifiable, because it is only created and becomes relevant in the course interaction (Dourish, 2001).

21. For instance through GPS, noise levels, lighting, etc

Locating interaction and interfaces

> Encounters at the interface invariably take place in settings incorporating multiple other persons, artifacts, and ongoing activities, all of which variously infuse and inform their course.
>
> —Suchman (2007, p. 284)

A corollary of viewing context as an emergent property, that fundamentally influences how people act and know, is that we must also refigure interaction not as a form of information processing, but as a form of meaning making (Harrison et al., 2007). Consider the amount of effort people put into making face-to-face communication mutually intelligible. Face-to-face communication is not so much an alternating sequence of action, but a joint action that is accomplished through "the participants' continuous engagement in speaking and listening" (Suchman, 2007, p. 87). This continuous engagement is so natural to us that we can often only detect it when it is violated. For instance, speakers often stumble when the listener is no longer actively listening and providing cues for the speaker, but instead is looking at his mobile phone to check a text message. Face-to-face interactions not only evolve and adapt to changing contexts, but also cause contexts to change, for instance when a new subject becomes relevant in on going conversation (Dourish, 2004). Appreciating the richness of face-to-face interactions can not only give us an idea of what computers cannot do or understand, but also shows us that meaning and context are constructed[22] during the course of in-

22. or mutually recognized

teractions (Harrison et al., 2007). Neither can be determined a priori, so they must be dealt with by other means.

If we cannot specify context or anticipate action, how can we design meaningful interactions? Suchman (2007, p. 278) argues that we should not view artifacts as fixed objects that prescribe their use, but as a "medium or starting place elaborated in use." This statement implies that design is an ongoing process that only produces temporary finalizations.[23] But when we design these finalizations, the alternative approaches to design, which we have outlined above, are compatible with the view of users as situated actors and social scientists' accounts of context. These approaches help us to design systems that can *accommodate* context. For instance, we can design specifically for appropriation by designing systems that leave room for users to produce their own uses and meanings (Sengers & Gaver, 2006). Another approach, developed by Gaver et al. (2003), sees value in *ambiguity*; for instance, by designing technologies that can be understood differently in different contexts. Perhaps the most important aspect of designing situated systems for marginalized communities, is to develop an understanding of their physical and social realities, focus on their real needs, and design technologies that are not just usable, but that *fit within those realities* and are actually useful (Richardson et al., 2010).

23. *See section 3.3.4 for a more detailed discussion of design-in-use.*

Locating researchers

> System developers become responsible for locating themselves within the extended networks of sociomaterial relations and forms of work that constitute technical systems.
>
> —Suchman (2002)

Figuring people as situated actors does not just apply to users, but also to researchers and designers. When we use hermeneutic and phenomenological lenses rather than purely analytic frameworks there is a definite symmetry between designers and users. Just as users are located in a culture, so to are designers. The values and power relations that come into play between designers[24] and users also come into play within design teams. And the reflexive acts of interpretation and meaning making that unfold during interactions[25] are the same for both users and designers. Thus, it is crucial to acknowledge our academic background, culture, and values as they inevitably come into play during design activities. Our knowledges arise out of our unique view points. So, it is important to collect and consider multiple interpretations, not just from multiple users, but also multiple researchers. Suchman (2002)

24. *or researchers*

25. *between people and people and artifacts*

argues that debating these multiple, located, and partial perspectives is the best route to objectivity. But this requires designers to relinquish the privileged position they have held in the knowledge production process given to them in more traditional models of HCI (Boehner et al., 2007).

Locating research within HCI

The discussion presented in this chapter leads us to conclude that our research is primarily located within the *third paradigm* of HCI. The term 'paradigm' was first applied by Kuhn (1996) in his seminal theory on the structure of scientific revolutions. Paradigms describe waves of research in a field and are built on top of some "implicit body of intertwined theoretical and methodological belief that permits selection, evaluation, and criticism" (Kuhn, 1996, p. 16). Harrison et al. (2007) document three major intellectual waves – or paradigms – that have shaped HCI and that are characterized by their view of interaction. The first two major waves of HCI respectively viewed interaction as a form of ergonomic coupling between man and machine and as a form of information processing. The third wave of HCI views interaction as "a form of meaning making in which the artifact and its context are mutually defining and subject to multiple interpretations" (Harrison et al., 2007).

The third wave grew out of a rejection of the second wave HCI and is defined in terms of what the second wave is not[26] (Bødker, 2006). As the third wave emerged many projects had an artistic, cultural focus and took more exploratory take-it-or-leave-it approaches to design. In her keynote address at NordiCHI, Bødker (2006) challenged the deep divide between the second and the third wave. She argues that researchers should recommit themselves to users and embrace their whole lives – not focus on either work or leisure; or either rationality or emotion.

26. non-work, non-purposeful, non-rational, etc.

This message resonates with our research, as mobile digital storytelling can be seen as a boundary object. It requires us to focus on developing an effective interface to combine aural and visual media, but also to consider how mobile digital storytelling fits into rural African communities. So, in embracing the third wave we should not outright dismiss the second wave, as valuable insights can be gained by considering both. Kuhn (1996, p. 85) describes the process of changing paradigms as similar "to a change in visual gestalt" or "to picking up the other end of the stick, a process that involves handling the same bundle of data as before, but placing them in a new system of relations with one another by giving them a different framework."

3.4 Research questions

We decided to formulate an open ended research question, and decided against developing a hypothesis or predicting the outcome of our research a priori. We did this in response to the exploratory, cross-cultural nature of our research, that exhibits an inherent unpredictability, and to avoid the constraining effects predictions might have on its outcome (see Marsden, 2009; Sengers & Gaver, 2006). Our research is guided by the following question:

1 Can an interpretively flexible mobile digital storytelling system be designed that accommodates the oral culture and context of rural African communities?

It was only after we started answering this question that we could fully appreciate our targeted community's oral culture and begin to understand how mobile digital storytelling could fit in rural communities. This appreciation and understanding led us to formulate and pursue two more, subordinate research questions:

2 Can this system be leveraged as a probe and uncover implications with regard to usability, digital storytelling in rural context, and future design directions?
3 And can such a system be made accessible to people living in these communities without prescribing a certain storytelling style?

3.5 Concluding remarks

In this chapter, we have shown how we intend to open our research to the question of design. We have explored the difficult relationship between methods, methodology, and epistemology. With this knowledge, we then formulated our methodology, which focuses on collaborating, interpreting, reflecting, experiencing, probing, and locating. We are particularly inspired by the rigorous and dialogical nature of Gaver & Dunne's (1999) deployment of probes. In the following chapters, we use, adapt, and rediscover the methods and insights we developed here, as we explore and design digital storytelling – both at the site of and beyond the interface – and learn about users in relation to ourselves and to our activities.

4 SITUATING DESIGN

Contents

In this chapter[1] we discuss and reflect on the methods, activities, and perspectives we used to localize design and situate digital storytelling in two rural African communities in South Africa's Eastern Cape. In essence, we explain how we turn social observations on communication and storytelling practices into a design and fully interactive prototype. At this stage of our research, this difficult agenda, which translates ideas between different intellectual domains (see Dourish, 2004), expresses itself in form of a collaboration between us and Nicola Bidwell. We begin by summarizing our previous experiences on digital storytelling and the observations we made during a digital storytelling workshop in Cape Town. We then present Nicola Bidwell's (2009) ethnography on the 'ways of doing and saying' in the Eastern Cape of South Africa. Then, we explain how we integrated our perspectives on mobile digital storytelling systems with insights on rural African communication practices that arose out of ethnography. The understandings we developed during this process led us to query our grounding assumptions about digital storytelling and usability criteria that manifest themselves in our

1. *Aspects of this chapter have previously been published in Bidwell & Reitmaier et al. (2010a) and Reitmaier et al. (2011).*

previous designs (see Reitmaier & Marsden, 2009). So instead of testing and refining our initial prototype, we implemented a method using cellphones to localize storytelling, involve rural users in design activities, and probe ways to incorporate visual and audio media. Products from this method helped us to generate design ideas for our current prototype, which offers great flexibility.

In acknowledging the roles we played during this design research endeavor, we must recognize that this collaboration took place at a certain place, time, and context. Precisely because of the reflexive character of ethnography, we believe that it is important that the perspectives, insights, data, and methods Nicola Bidwell brought to this collaboration are reported in her own words. By discussing these in this chapter, we also hope to illustrate how we appropriated some of these design perspectives and carried them on in the field testing and deployment stages of our project. Thus, we present parts of our collaboration as excerpts from a research paper[2] that we co-authored and published and presented at CHI 2010. I have made only minor editorial changes to the excerpts[3] and have included a number of sidenotes to clarify certain concepts.

3. Sections that are part of the research paper are indicated by an asterix (*).

4.1 Integrating perspectives

In this section, we explore the perspectives that we brought to this collaboration. We begin by summarizing the observations we made during a digital storytelling workshop and introduce an interactive prototype we implemented, which is based on the designs of our previous work (see Reitmaier & Marsden, 2009). We then give an excerpt from our research paper in which Nicola Bidwell introduces her ethnographic perspective on rural communication that is situated in a rural community of South Africa's Eastern Cape. We use these perspectives to draw implications for the design of a mobile digital storytelling system that suits the needs and functions of rural African communities.

4.1.1 *Observing a digital storytelling workshop*

We were able to observe parts of a three-day digital storytelling workshop that was part of the Feminist Tech Exchange[4] (FTX) in Cape Town, organized by Sally-Jean Shackleton of Women's Net[5] and Jennifer Radloff of

4. http://ftx.apcwomen.org/

5. http://womensnet.org.za/

2 Bidwell, N. J.*, Reitmaier, T.*, Marsden, G. & Hansen, S. (2010), «Designing with Mobile Digital Storytelling in Rural Africa», in «Proceedings of CHI '10», pp. 1593–1602, ACM Press, New York, New York, USA. *Joint first authors.

APC Women.[6] Most of the workshop participants were women between 20 and 30 years old, and they came to Cape Town from urban and rural areas all over South Africa to learn about technology, social networking, and digital storytelling. Many of the participants work for NGOs and other community organizations, and some of the women have also been the victims of violence and crimes. Because of the sensitive nature of their stories – many of which dealt with issues such as rape and violence against women – we did not observe all parts of the workshop. In particular, we did not observe the Story Circle, where participants share and develop their stories.

6. http://www.apcwomen.org/

We were able to observe most of the facilitator's explanations and instructions. The facilitator compared digital storytelling to cooking, where the recipe is her instructions, the larder is the media store, and the place where everything comes together and the cooking takes place is the timeline. In the later stages of the workshop, when it became time for the participants to produce their stories, we observed and helped the participants create their stories on the Microsoft Movie Maker 2.5 video production suite. The facilitator told us that Movie Maker was already much easier to use (and a lot less expensive) than older versions of Adobe Premiere, which she had used in previous workshops. However, by observing the participants cut together their 'movies', which consisted of an audio narrative and still pictures, we noticed that participants had great difficulties using the software tools. This was especially true for those who had little experience of using computers. The problems started with transferring media to the PC from digital cameras and voice recorders and locating them on the PC afterwards. Synchronizing the pictures to the appropriate portion of audio also proved to be difficult and at times frustrating for the participants. This highly iterative process involved listening to a bit of the narrative, then timing and adjusting the picture display duration to the millisecond, and then checking the outcome. If the program crashed, as it did for two participants, or if a participant made an adjustment at the beginning of the story, the whole process has to be completed again.

In the end, and despite the difficulties they had, the participants were extremely happy with the stories that they created and felt empowered by the experience. Even those who were not able to finish their digital stories said that the human side of the whole process was the most rewarding.

(a) Recording audio. (b) Synchronizing photos to audio. (c) Story with photos and audio.

Figure 6: Elements of the 'story-driven' interface of our first fully interactive Mobile Digital Stories system.

4.1.2 *The initial mobile digital story prototype*

In section 2.2.4, we have introduced the designs of our previous mobile digital storytelling system and explained the methods and evaluation criteria we used. The Flash Lite prototypes we implemented, however, were not fully interactive – in the sense that participants could only access a pre-defined set of images – so our work focused on developing interfaces to synchronize audio with photos or photos to audio. On those prototypes, users could only create a pre-defined story about a dinner party.

To explore the meanings *behind* mobile digital storytelling in a more nuanced way, we developed another, fully interactive prototype in Mobile Python (Figure 6). This prototype was informed by usability outcomes from the story-driven prototype of our previous work, but enabled users to record and select their own audio and photos. On this interface, the user first records a story or story segment (Figure 6a) and can then add photos to the story (segment). In the next step, the user synchronizes the photos to the audio by transitioning from one photo to the next while the recorded story (segment) is played (Figure 6b). This completes the digital story (segment), and it can be played back or an addition segment can be appended to the story (Figure 6c).

The aim of this prototype was to explore a more elaborate – non-scripted – interaction scenario, where users construct their own story, rather than read from a script. Nicola Bidwell tested it in-situ in a

Figure 7: Headman of Lwandile oversees a village meeting. – © 2008 Nicola Bidwell.

minimal way in the Eastern Cape with Sibongile, a man who is known locally as a great storyteller. Sibongile mentally composed his story first and then included only two photos, which he said had limited relations to his story about a trip to a city. Nicola Bidwell also used the prototype to create her own digital story. In contrast to Sibongile, Nicola Bidwell preferred to develop a storyline over time in situ and was more photo-driven than Sibongile. The prototype provided us with a tangible artifact – rather than an abstract concept[7] – around which we could conjecture how use might diverge from ways of doing and saying depicted ethnographically.

7. Klemmer et al. (2006) argue that prototyping fosters design thinking.

4.1.3 **Ways of doing & saying in Eastern Cape, South Africa**

This section is based on a part of our research paper: Bidwell & Reitmaier et al. (2010a). We have shortened and edited it.

Our ethnographic perspective on storytelling is informed by data that Nicola Bidwell gathered independently of developing initial prototypes and is situated in Lower Ndungunyeni in the Wild Coast of South Africa's Eastern Cape. The region is geographically and culturally remote, and everyday life anchors to customary communication and power structures and traditional habitation and land-use. Most residents can trace their ancestry to the settlement of the 50km^2 area at least eight generations ago by the Khonjwayo, one of six Chiefdoms descending from a distinct tribal monarchy. Families live in umzi, which are informally distributed clusters of thatched mud-brick rondavels, fronted by a garden for subsistence crops and connected by paths across hilly common grazing land. Formal, legislative institutions are separate from custom and daily

practice; for instance, people elect politicians but are closer to Headmen who inherit leadership patrilineally (Figure 7). Ndungunyeni's 20,000 inhabitants are acutely impoverished and, with remittances, pensions and child benefit, 80% of families survive on less than 10% of the national, median income for a working white man. Even those benefiting from a relative's temporary migration to a city or able to diversify their income have limited local access to 'modern' facilities (Bidwell & Browning, 2009). There is poor transport, no sanitation, and most of Ndungunyeni has no grid electricity, although clinics, some schools, and a few homes have solar power.

Insights on storytelling, oral and digital communication emerged over 18 months as Bidwell (2009) formed relationships, interpreted priorities, discovered design opportunities in the ad-hoc details of daily life, and undertook socio-technical experiments. Through the Non-profit organization (NPO) Transcape and the son of Ndungunyeni's senior Headman, Nicola Bidwell was able to establish relationships with the community. This enabled her to live, according to local norms, in the village of Lwandile for two months to collect data on domestic and community life and participate in everyday activities. A more detailed account of these activities is given by Bidwell (2009); Bidwell & Browning (2009); Bidwell & Reitmaier et al. (2010a).

4.1.4 *Design implications*

By integrating our perspectives, we were able to gather numerous design implications that help us to not only design a mobile digital storytelling system that suits the needs and functions of the Lwandile community, but also to design a method, which localizes storytelling and involves rural users in the design of that system.

Value of mobile digital storytelling

Observing the digital storytelling workshop gave us a first hand experience of how powerful to watch and empowering to create digital stories are. But, we also saw that video editing software suites are unnecessarily complicated for the production of simple digital stories. A simple, mobile digital storytelling system could enable users without access to personal computers to preserve, reflect on, and share their own life experiences and express their imagination digitally. Such a system is especially useful for the tacit or performed knowledge that rural people routinely transfer

informally but is not easily abstracted (Bidwell & Browning, 2009), as they can ascribe meaning by referring to context.

Locating storytelling

It is not hard to imagine that our storytelling and communication practices differ from those in rural African communities. The reason for this lies buried beneath the concept of *orality* and can be found in the difference between 'primary orality' and 'secondary orality' (Ong, 1982). Orality theory argues that the written word has so profoundly altered literate cultures that we, as members of that culture, can no longer easily understand how oral cultures and people "think, communicate, and learn" (Sherwani et al., 2009). In addition, our media heritage and technologized lifestyles have changed how we communicate, and, in turn, how we tell and listen to stories. Ever increasingly, we rely on indirect, mediated forms of communication that define our secondary orality. This has also influenced how we design digital storytelling software and implement digital storytelling workshops, but contrasts with how community members in places such as Lwandile and villages all over Africa communicate. They rely on direct, unmediated face-to-face communication or a more 'primary orality', due to their cultural antecedents, location, and low technology ambiance. This is also illustrated in Sibongile's and Nicola Bidwell's differing usage of our prototype and has alerted us to assumptions about storytelling that are manifested in our design and embedded in mediated orality, writing and 'hyper-visual' culture.

On the basis of the development scholar Robert Chamber's seminal question "Whose Reality Counts?" (Chambers, 1995), we pause for a moment and ask ourselves a similar question – *whose story counts*? We ask ourselves this question to avoid the danger of overemphasizing our knowledge of digital storytelling, development agendas, and media over the knowledge of the rural communities we engage with. Theirs is the knowledge we are interested in and which is critical to the success of our design. Theirs is the knowledge that is local, social, and in tune with what they experience and prioritize (Chambers, 1995).

Storytelling in design

If we accept that storytelling is culturally located, we must proceed cautiously in designing mobile digital storytelling software because the same exposure to different media and stories that shapes how we create, tell, and listen to stories also shapes our use of stories in HCI – to depict

design requirements and engage with users. For instance, diary-studies, photo-logs, scenarios and design documentaries are culturally-situated communications (Gaver, 2007), and even sketching in rapid prototyping relies on habits of graphical representation. These methods, whether user-centered or participatory, are *located* (Suchman, 2002) in Western culture: heavily influenced by our use of the written word, mediated forms of communication, and our secondary orality (Ong, 1982).

Conceiving a new method

This difficulty raises the challenge of understanding the local activity of storytelling through the process of design. So, we advance this goal by framing design dialogically (Wright & McCarthy, 2008). That is, we *embrace* the idea that the meanings we make about storytelling are always unfinalized as they live in sets of *relationships* between ourselves, others and diverse aspects of settings.[8] Instead of further evaluating and refining our initial prototype, which reproduces culturally located conceptions of digital storytelling, we consolidate the outcomes of interrogating our prototype with an ethnographic depiction of the *fine details* of what people did in the rural setting and how they communicated. We use these insights to co-develop and localize a method – centered around a basic *technology probe* consisting of two camera phones – to involve rural people in a storytelling design workshop and to explore ways to incorporate visual and audio media.

8. See section 3.3.4 for further details on dialogical design.

4.2 *Provoking a probe*

This section is part of our research paper: Bidwell & Reitmaier et al. (2010a).

Insights into local priorities, communication practice and technology-access in Ndungunyeni confirm the potential value of a mobile digital storytelling application. Up to half of 9-year-olds in Lwandile cannot read, partly because school children are taught literacy in English, but villagers usually speak isiXhosa. Illiteracy is not stigmatized; rather, social practice and preferences for media, when present, emphasize orality, song and dance. Villagers have limited access to TV and their main media are radio and cell-phones. They make calls more rarely and abruptly than they would like, as airtime is prohibitively expensive, and use SMS as it is cheaper. Villagers were enthusiastic (e.g. in the Archives Workshop[9]) about recording local stories and felt video might preserve their heritage in ways writing cannot. But, they also noted that recording must be compatible with the features of orality and performance that

9. A 3½-day workshop on Archives in Lwandile School, attended by over 50 villagers.

construct their local identity and not threaten social structures in the way that elders attribute to American movies. This provoked us to query our initial concept through an ethnographic lens, and structure new activities to hear users' voices in design.

Supporting agility and serendipity

By inferring the ways the initial prototype might have been used in the storytelling situations we observed in Lwandile, we realized that a story-driven approach may not serve a storyline that emerges serendipitously. Villagers' accounts were often prompted by cues in the landscape (e.g. the tree that a villager's brother planted); in ancestry (e.g. the Headman's lineage); or by images (e.g. a sequence of photos taken at the King's party). In our blogging activities,[10] villagers often found it difficult to think of a story without such resources. So we sought a loose, non-prescriptive way to enable participants to create storylines by drawing on the representational, physical, or social. The mechanism to do so needed to take into account, firstly, that villagers are unfamiliar with the mutability of software development as most, with the exception of our experiments,[11] have never used a computer or feature phone. Secondly, villagers treat writing as special, and sketching and writing materials are not available locally (Bidwell, 2009), so paper prototyping, typically used to defy rigidity and determinism, is unsuitable. To give participants a flexible and easily observable way to record and combine photos and audio, we decided to use a pair of low-end camera-phones and their rudimentary default image and voice recording software. We dedicated one phone, Nokia 6600, as a camera and the other, Nokia 6630, to record audio. This technology probe had enough ambiguity to reduce constraining use but aligned with villagers' experience as most, over 15 years, own or share a basic phone (e.g. Nokia 1100).

10. Nicola Bidwell set up blogs and facebook accounts for villagers, including the Headman's son.

11. Villagers who participated in the facebook and photo-blogging activities.

Probing collaboration in storytelling

Our initial conceptualization of mobile storytelling as an individual activity is discordant with villagers' proximity, shared use of phones and communication norms. They devote significant time exchanging views in meetings, and these protocols of speaking and listening contribute to cohesion, shared identity, and security. We thought that a workshop in which participants used a camera-audio phone pair in groups would enable us to observe task division and requirements for collaborative elements. We were eager to notice diversity in collaborating in audio recording as we have observed gender differences in patterns of turn-

This figure was not part of the original research paper.

Figure 8: Displaying unity in everyday life in Lwandile – © 2008 Nicola Bidwell.

taking that manage spoken interaction and participation. In male and mixed groups people listen quietly until a speaker finishes but, in female-only groups, women often repeat items in synchrony with each other (Bidwell, 2009).

Enabling core values to localize usability

Our experiences in Lwandile led us to question the values underlying the usability of our prototypes. For instance, we evaluated our initial concept on efficiency criteria, but in face-to-face dialogue villagers prioritize launching and maintaining relationships over speed. Consider the way the Headman's son first ingratiated the Education Minister, using photos on his cell-phone, before illustrating Lwandile School's need for resources; and the prolonged debate in village meetings that feeds into a Headman's decision-making about collectively-owned resources. Realizing that speed is less salient in dialogue than consensus or 'friendship made by speaking' prompted us to reconsider values affecting expressivity and usability. Villagers in Lwandile emphasize displaying unity in everyday life (Figure 8), such as expressing solidarity and belonging by joining in songs each day. They do not recognize such inter-dependence as a trait defining Western constructs of personhood (Bidwell, 2009). Further, while some African traditions perform tales to big audiences, Xhosa story-telling was 'essentially a private matter' carried out amongst those who knew each other well to ensure rapport (Finnegan, 2007). Thus, we spread activities over consecutive days, so participants could involve others outside the workshop in their own way and used part of the phone-pair probe to record data on interactions remotely.

Providing privacy in participation

We sought to reduce the effect of inevitable power relations on use of our phone-pair probe. For instance, participants might have felt shy about recording opinions for us to scrutinize. We sought to respect the boundaries that enabled people in Lwandile to separate their intimate locale from external structures and outsiders. One such boundary is language, so we decided to ask participants to record stories in isiXhosa, even if they knew English.

Probing the materials used to convey meaning

Concepts about people's use of resources to prompt and progress storylines and convey meaning in stories are embedded in the story- and photo-driven approaches of our initial prototypes. However, we noticed that the landscape progressed the narrative in storytelling in Lwandile and prompted recollections. For instance, the Headman gestured across hills in reminiscing sending a messenger on a horse, and his son animated stories of his youth by indicating a forest. By encouraging participants to take as many photos as they wanted between two workshop sessions, we hoped to discover relationships between content in photos before their integration into stories. Thus, even without necessarily understanding the audio, sets of photos might provide insight into both the experiences that prompted participants' stories and storylines and the choices they made in integrating and balancing photos and audio.

Probing converging perspectives in narrative structure

Our initial prototypes instantiate rules about unidirectional story and timeline, but more recent trends, such as online story mash-ups,[12] support multiple viewpoints around a theme. While villagers' individual narratives certainly seemed to have a story arc resonant of a singular linear flow, group communication arose through orthogonal relationships between diverse perspectives. Importantly, villagers seemed to pursue unanimity through disparate tangents so their voices seemed interdependent. This may be a consequence of oral narrative's inherent malleability, to history and politics, and a need to unify community and maintain elder and patriarchal authority. In all group communications involving dissimilar views and ideologies, villagers emphasized that resolution emerges by listening to multiple perspectives, not by overt coercion. For instance, neither the Headman nor the incumbent Chief's emissary expressed disagreement in re-telling their genealogy; they simply told the

12. See also (Scheible et al., 2007).

same story of their lineage, which differed in one fine, but critical, detail; who was the firstborn of twins some eight generations ago. Thus, we sought to sensitize ourselves to participants' management of interactions around multiple views; for instance, if they collaborated did they favor a unitary narrative, interrupt linearity or connect various directions from disparate parts?

Generating empathy between designer & user

As we reflected, we encountered difficulties in uniting our initial storytelling concepts with our insights on villagers' storytelling and role-playing these insights using the early prototype. We were anxious because we knew Lwandile villagers felt outsiders did not articulate the meanings that entwine their identity with a setting in which their kin have resided for generations. We observed how the features of, and material used in, their storytelling join to expectations bound to community, place, and being Khonjwayo. Lwandile's isolation and a daily-life spent outdoors means villagers are not anonymous and from birth to burial, and beyond, their identity is etched into the land and their stories index to the furniture of rural life. Relationships are encoded, symbolically and syntactically, in the landscape; customs define where a villager can establish an umzi, and as they are buried in their umzi, ancestors' graves are nearby. Name sounds acutely associate with umzis, as isiXhosa language carries in the open-air, and names carry stories. Thus, we sought to ensure that our activities would sensitize us to facets of participants' identity. We hoped that the 'returns' from our phone-pair probe, such as ambient or contextual content of photos or audio and the resulting digital stories, would engage ex-situ designers[13] empathetically. We also hoped that video of the workshop would enable us to link our more ephemeral experience of participants' worlds, through the probe returns, to concrete interactions with technology.

13. Thomas Reitmaier

This section is part of our research paper: Bidwell & Reitmaier et al. (2010a). The workshop was held by Nicola Bidwell, who was assisted by Susan Hansen.

4.3 *Deploying the probe*

We deployed our phone-pair probe in the village of Tschani, 15km from Lwandile. This enabled us to host the accompanying design workshop in Transcape's Education Centre nearby; which, in normal circumstances, has access to electricity. We ran the workshop on two consecutive afternoons and recruited six participants via the NPO, five of whom lived in Tschani. Participants included two young men: Bafundi (20 years)

and Sphiwo (22 years), who occasionally attend the Centre; and four women, two pre-school teachers at the Centre: Kholiswa (23 years) and Nolutho (33 years) and two of their friends Celine (22 years) and Noileka (23 years). Three participants were fluent in English, and the others understood a little but would not speak in English during the workshop; so one participant, Nolutho, translated our explanations. At the end of both sessions we compensated participants with dinner. We used a mini solar panel to charge the phones due to a power-cut during the workshop and had to substitute a Nokia N95 for one Nokia 6630 phone to record audio.

4.3.1 *Workshop session 1: overview and learning to record*

At the start of the first afternoon, as participants arrived and looked at the phones on the table at which we sat, we discussed cell-phones. Bafundi, Noileka, Kholiswa and Nolutho own Nokia 1100s, Sphiwo a low-end Samsung, and Celine a Nokia 2300. They were all intrigued and enthusiastic about the N95 and asked us the cost of such a model. Then we outlined that the workshop's purpose was to inform designing functionality for digital stories and participants' roles as 'user-researchers'. We simplified some explanations, such as that we were designing a phone, rather than software, that would be affordable locally. Then we demonstrated, on a laptop, a digital story that we had created a day before. The story was a comical parody of Nicola Bidwell's experience in Lwandile as she learnt to carry a bucket of water on her head, but was set in Tschani with photos of villagers undertaking their ordinary activities. As we had hoped, participants found the story amusing and accessible; but we also emphasized that digital stories can be more serious, historical, or informational.

Before using the phones, we discussed participants' views on what they might use digital stories for (e.g. education, training, news to family, fundraising). But, participants were reserved and the men seemed distracted, relying on the women who worked at the Centre to engage. We realized that although we modeled our introduction on the didactic delivery we observed in the Archives Workshop at Lwandile School, this might not match our participant's expectations. The Archives Workshop was organized by villagers and involved, mostly, male presenters. In contrast, our digital stories workshop was facilitated by white women in an Education Centre, which adopts a more constructivist approach than the formal and informal education in local schools or village practice.

This figure was not part of the original research paper.

Figure 9: The audio (left) and photo (right) phones of the phone-pair probe.

Participants became more animated as soon as we began activities with phones. We explained that they should use the phones over the next 23 hours to take as many photos as they wanted (of which they would receive printed copies) and incorporate into stories in any way they preferred. They formed three groups according to friendship and home location: the two young men, Bafundi and Sphiwo together; Kholiswa with Celine and Noileka; and, Nolutho on her own as she lives in a distant village. We demonstrated and assisted use of the Nokia 6600's Camera and Gallery software and then participants practiced in the NPO's grounds. We observed them take photos in their groups and show their photos to the subjects in them (e.g. workers and visitors) and to other participants. Then back in the Centre, we reviewed how to delete photos and, while recharging the 6600s, demonstrated the 6630's and N95's Voice Recorder software. All participants eagerly engaged with audio and unselfconsciously recorded their voices. Before ending the first session we reflected on storytelling to emphasize there is no right or wrong way to tell a digital story. The women had ideas about stories, but the men felt uncertain and asked for guidance on composing storylines. We agreed that it can be difficult to think of a story and encouraged their confidence by facilitating a discussion of stories, such as recounting the events of a recent village football match.

		K, C, & N	*N*	*B&S*			
Duration of story in minutes		3.18	1	1	1		1
Number of photos		22	7	6	6	3	5
Duration of voice-overs	min	3	8	5	5	17	5
per photo in seconds	max	25	11	20	12	24	11

Table 1: Audio to photo ratio in stories.

4.3.2 *Workshop session 2: creating and assembling stories*

While participants arrived on the second afternoon, we chatted about the photos they had taken since the previous afternoon and problems they encountered. Nolutho took 60 photos on her own; Bafundi and Sphiwo took 41 photos together; and, the other group took 78 photos, which were mostly taken by Kholiswa as the battery was flat by the time Celine had the camera-phone. Participants noted their disappointment in being unable to take photos in the low illumination of their homes, which have few windows and no electricity, so 30% of Kholiswa's photos were black.

After we had recapped on workshop aims, we reviewed making audio recordings and asked participants to reflect upon their stories. We asked whether participants thought it would be easier to: record speech and then find photos to fit; think of a story then decide on suitable photos and record speech; or view photos and record speech. In their discussion, they were undecided between these methods. Participants then separated into their groups, discussed their stories, and recorded audio for 90 minutes. Groups made varying number of stories (Table 1), and some did not finish all of the stories they intended. Bafundi and Sphiwo deleted the sound-clip to one story, and Kholiswa's group had a set of photos they took to use in a story about her father counting sheep in the morning. To conclude the session, and enable us to assemble stories after the workshop, each group went through their audio, photo and stories. While groups constructed stories in distinct ways, they all tended to co-ordinate voice-overs in one audio clip with a sequence of photos. We had mentioned that one option was to associate a photo with a short audio clip but they preferred to record voice-overs of a minute, with the 6630, or longer with the N95; and use the pause function. Thus, participants listened to an audio clip and indicated to us the time that it should synchronize with a specific photo. This was trouble-free, and we easily cut stories together after the workshop. A week later, we sent albums of photos to participants and DVDs for groups to view their stories at the Centre.

Main Subject of Photo	*Group*		
	KCC	*N*	*B&S*
People	87	68	80
(of whom are children)	(36)	(17)	(22)
Buildings or interiors	6	10	0
Livestock	8	7	15
Landscape / garden / grass	0	15	5

Table 2: Content of photos as taken by the groups.

4.3.3 *Probe returns*

The content of participants' photos (Table 2) included a range of details about everyday life and values, some candid and intimate; from pigs, to puddles to a naked infant peeing. There were stunning photos of landscape, of sun-light through branches or haloing a cow. Most contained people, in homes, gardens or fields, often undertaking activities (e.g. cleaning, cooking). Participants' stories also focused on people and, for the women, these were bio-graphical. People were in all but one of the 22 photos in a group's story about Kholiswa's infant daughter's routine from awakening to walking to school. Nolutho featured in all photos of her story about gardening, showing that she enlisted a friend. Bafundi's and Sphiwo's stories were staged performances with props. Two seemed deliberately comical: chasing pigs from a home and an infant using a cell-phone; but two seemed to be a gentle satire about their life, they alluded to issues of alcoholism and producing sufficient melons to feed a huge family.

4.4 The second prototype

The features of our current prototype reflect the insights generated by activities in the design workshop and observing participant's interactions with the phone-pair probe.[14] Here, we reflect on how we gained those insights, discuss the provenance of our prototype's features, and compare its functionality to similar software.

14. A video, linking features of our prototype to workshop video, has been published in Bidwell & Reitmaier et al. (2010b) and can be viewed online.

4.4.1 *Inspiring a design*

The design of our most recent prototype was, for the most part, inspired by the ideas we gathered while reviewing the workshop video and focusing on the participants's interactions with each other and with the

phone-pair probe. Nicola Bidwell also noted many first hand impressions and ideas while she observed participants in the workshop and when she assembled digital stories and participants' photo albums. These perspectives and 'gut feelings' (see Gladwell, 2005) provided us with additional interpretations (Sengers & Gaver, 2006) of events and design requirements, which we used when we later perpetuated, added and disputed design ideas. Nicola Bidwell steered us (Thomas Reitmaier) through the participants' photos and stories and through her notes and video of the workshop. By stating her interpretations of workshop and of the video, Nicola Bidwell provided us with crucial insights on the workshop and the participants experience of it. So in essence, she acted as a proxy for the community. Together, we also noted further design requirements during this first viewing and sketched out some basic ideas. We (Thomas Reitmaier) then watched the video seven further times for inspiration and analysis, but rarely in entirety. Rather, we would watch an hour or so, pause to play with and sketch an idea and then query the idea by reviewing the video. The first two viewings familiarized us with participants and inspired some design requirements. This familiarity, in turn, enabled us to gather less palpable ideas in subsequent viewings, such as the interface's general feel and ways to combine all design requirements. The video alerted us to subtle interactions; for example, we conceptually fused the two phones when Nolutho held them closely together in recording her story (Figure 9). We posed numerous scenarios to explore and refine the design space and, iteratively, improve ideas. For instance, we rejected an initial idea of a script writing tool, based on Bafundi's and Sphiwo's use of a handwritten storyline, because Nolutho and Kholiswa's group built or adapted a storylines in more situated way.

4.4.2 *Design features and their provenance*

Our current prototype runs on Symbian S60, the most prevalent operating system for feature phones globally, and is implemented in Mobile Python (PyS60) with Symbian C++ wrapper classes providing access to the camera and media gallery.[15] Participants' mutual physical proximity in the workshop confirmed earlier observations that viewing the cellphone as a 'personal device,' affording use by one person at a time, is based upon Western habits of 'personal space.' Thus while we designed the prototype for mostly single user scenarios often features reflect participants' collaboration. For instance, we aimed to create a flowing interaction inspired by the way women in Kholiswa's group took turns

15. We have released these wrapper classes to the wider PyS60 community: `http://code.google.com/p/pymgfetch/`.

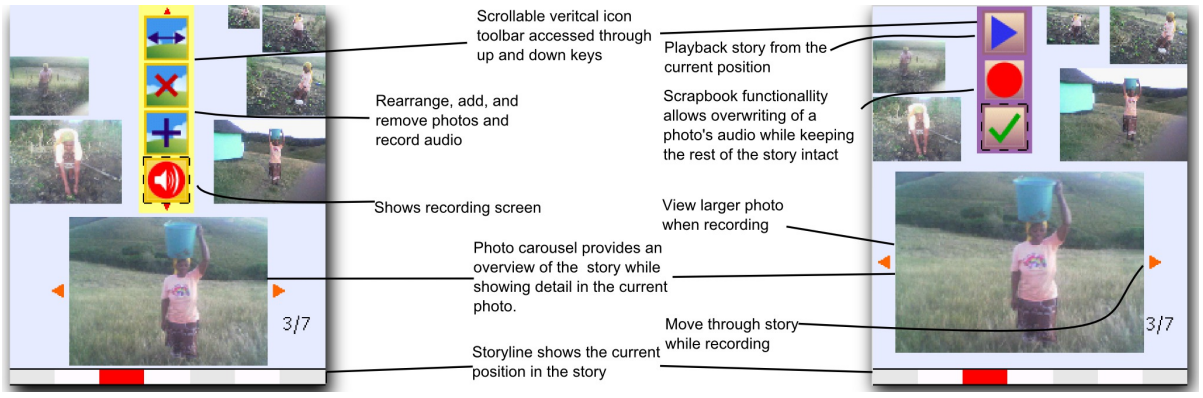


Figure 10: Mobile digital storytelling prototype and elements of the Storyboard (left) and Recording (right) interfaces.

to say parts of the story, associated with each photo, and fluidly and intuitively knew when to speak. Thus, we synthesized interaction ideas and requirements into an interface that might respond to the storyteller as a friend might; much like the way Sphiwo located photos on one phone to help Bafundi as he recorded audio on the other.

Once open, the prototype presents the user with a centrally positioned tool bar of icons for adding, selecting and rearranging photos and recording audio (Figure 10). This reflects participants ease in using the vertical icon toolbar interface of the voice recorder application but difficulties using text-based menu systems in the probe. We designed for flexibility so that the user can begin by recording audio or adding photo/s because the three groups in the workshop had different story recording strategies. If the user clicks the 'add photo' icon the application launches the default image gallery to enable selecting from thumbnails and filenames. We based this decision on observing participants use of thumbnails in the phone's gallery application.

When the user has selected all the photos s/he requires, at that time, the prototype displays them in a storyboard carousel of up to 11 photo thumbnails in increasing sizes, scaled to make best use of screen real estate (Figure 10). This arrangement aims to reduce the time overhead that participants encountered in navigating through photos in a linear system and memory load in recalling a long sequence of photos. The carousel also enables easy navigation and may assist users in planning a storyline; for instance, Bafundi and Sphiwo had written storylines on paper which they consulted to help them co-ordinate audio with photos. Sometimes they annotated their lists in between recording audio – suggesting that during the process of recording they realized a more effective order to convey their story. In general, the way some

participants spent large amounts of time searching through photos, while revisiting a couple of specific photos many times, reminded us of a puzzle. To solve a puzzle people pick up a piece, change its orientation, try out some possible solutions, before placing it near similar pieces. But the groupings that people make while solving a puzzle seldom are the final solution. Before a solutions is reached, individual pieces or groups of pieces are moved around to see where they 'fit'. Similar to how people solve puzzles, we wanted our interface to support emergent storylines, where the sequence of the photos can be easily changed. Our prototype's carousel offers users exactly that – a way to envisage alternative story structures, such as possibilities for patterns and repetition, as photos do not appear along a vertical or horizontal.

The user can add photos and change the order of photos on the carousel at any point before recording audio. This is vital as Nolutho, Bafundi and Sphiwo wanted to alter the order of photos during or at the end of recording an accompanying audio. We used animation so the photos move around the carousel when re-ordered to help reduce errors, such as Nolutho's confusion about the direction of her photo sequence. The user can include multiple copies of photo in a story, which may serve in revisiting a feature or the emphasis and rhythm that similar photos provided to Kholiswa's group's story-telling. The user can also take photos from within the prototype by launching the camera. We based this decision on analyzing the photos in Nolutho's story. Most of the photos that she included in her story appeared in the order in which she took them.

We intend the recording photo carousel of our prototype to also flexibly enable users to draw upon visual cues in telling their story. Most participants held the two phones next to each other while recording audio, drawing on photos as memory prompts. To support this, the prototype enables users to view photos in the carousel. They can record the audio on a photo-by-photo basis; as observed for two groups who paused recording after viewing each photo and resumed as the next photo was displayed. Alternatively, users can view the next photo of the story while recording audio. One group consulted written storylines on paper to determine the next photo against which to record audio. As Bafundi recorded audio Sphiwo located the next photo in the sequence to help him. The carousel permits the user to move to the next photo without having to pause recording, and thus, enables users to record their own rhythms in speaking. Throughout this process the prototype captures all interactions with the carousel for the user to draw upon in

photo transition timings during playback, for instance to map photo timings to vocal patterns.

The prototype allows the user to record audio in one go or record and playback in segments. Recording the story in entirety might suit users like Sibongile, the expert storyteller who used our initial prototype, or people with scripts. The user can playback a recorded audio segment; just as Bafundi and Sphiwo replayed an audio segment they had just recorded, to check it sounded right. The prototype also enables users to supplement audio because when Nolutho listened to her audio after re-ordering her photo sequence she said 'I need to explain more' and created another sound clip to insert into the middle of her story. Recording in segments also offers the capacity to tag photos in a serendipitous manner and collect a 'scrapbook' of audio-tagged photos. Thus, a user can construct a story in pieces and iteratively refine segments until a final story emerges; which might support those who compose by collage and workshop participants who situated stories in a journey or had difficulty in formulating a story idea. It also supports shared storytelling as multiple users may use a phone to contribute their own story segments.

4.4.3 *Contrasting the prototype with similar software*

Our current prototype differs from the details published about other mobile digital story applications. Firstly, unlike either Jokela et al.'s (2008) MMPE or Jones et al.'s (2009) StoryBank our prototype allows flexible usage of audio and/or photos. MMPE and StoryBank were modeled on another media (e.g. PowerPoint) or designed to suit the story-format of the Digital Storytelling movement (Crook, 2009; Hartley & McWilliam, 2009) and have a task flow for integrating audio and photos. Secondly, like StoryBank, our prototype avoids written text and presents icon-based interfaces to the user. In contrast, MMPE uses text menus and permits users to include text and stickers in their presentations. Thirdly, unlike the other software, our prototype allows users to iteratively record the story's narrative and craft the audio experience, with or without photos. Finally, while StoryBank and MMPE allow for one recording of 1-2 minutes our prototype does not restrict audio duration or quantity of photos. The unique affordances for audio seem vital for rural African users.

4.5 Concluding remarks

We set out to design a mobile digital storytelling application, but instead we refined a culturally informed technology probe to gather data in storytelling. We chose not to test, and then refine, our initial prototype in a rural community as ethnography revealed that our initial concept of mobile digital storytelling was profoundly localized in Western storytelling. Thus, we devised a method to explore digital storytelling in a more nuanced way. The experience of designing our prototype in this way sensitized us to just how critical it is to ground designs and methods in local practices. Watching people interact with the probe and catching glimpses of their lives by looking at their photos and stories, we also realize that our prototype[16] is a valuable design tool, which allows users to express themselves in design in a way that is better suited to their communication norms.

16. and mobile digital storytelling in general

4.5.1 *Separating work*

A rough separation of our work is that Nicola Bidwell used her insights, that arose out of ethnography, to localize a method to involve rural people in a digital storytelling design workshop; and that I worked through the workshop video to translate the outputs of this method into a design and then implemented the design into a fully interactive prototype. But, as this chapter shows, the boundary between Nicola Bidwell's work and mine is fuzzier, as is the case in most healthy collaborations. We can say for sure that I played no part in Nicola Bidwell's ethnography and that I was not there to implement the design workshop. Likewise, Nicola Bidwell did not participate in our previous work, nor did she help implement the prototype of the resulting design. But it is also more helpful to view this collaboration not as separate activities, but as an integrating of perspectives and interpretations. So while the design workshop was in large parts framed around insights that arose out of ethnography, it was also informed by the initial prototype and our insights on mobile digital storytelling. And while the design of our current prototype reflects most of the themes that I derived through many reviews of the workshop video, it also reflects some of the 'gut feelings' that Nicola Bidwell noted during the design workshop or that we developed during the first viewings of the video.

4.5.2 *Outlook*

By learning from each other and integrating our perspectives and interpretations into the design workshop and then into the design of our second prototype, we hope to have designed a system that can be interpreted broadly (Sengers & Gaver, 2006). These perspectives and interpretations did not originate with us. Instead, they are based on the interactions of the workshop participants and the interpretations of digital storytelling they formed and enacted. So we are hopeful that the 'our' in our design does not just include us, but that it also reaches into the communities that we are designing with – that it, at least to some degree, represents a rural African interpretation of mobile digital storytelling.

Through this collaboration, we also began to appropriate some of Bidwell's perspectives on design. We are eager to continue this design dialogue (Wright & McCarthy, 2008), which Nicola Bidwell started in Lwandile and Tschani, in field testing and evaluating our designs – paying particular attention to finer details of storytelling (Finnegan, 2007) and the context in which this dialogue takes place.

5 FIELD TESTING

Contents

In this chapter,[1] we discuss how we field tested a prototype of our mobile digital storytelling system in Adiedo, Kenya. Although Adiedo and Lwandile, the site of Nicola Bidwell's ethnography, differ in aspects of their culture, geography, and language, these two communities share the characteristics of some 200 million people in sub-Saharan Africa in terms of their rural locations, low literacy, and rich oral traditions. We felt that transferring our system into a different community, albeit one facing similar constraints, was possible because the design of our system responds to a need for *flexible* digital storytelling – an aspect that could transfer well into a different community. We decided to field test the prototype in Adiedo to initially assess its usability in-situ but later on used our prototype to probe how rural, oral users might *interpret* and make use of mobile digital storytelling. These activities allowed us to learn firsthand about users, their stories, and their context in relation to our prototype. We wanted to leverage these perspectives to improve the design of our current system and shape the design of future mobile digital storytelling systems. We were also eager to compare the insights

1. Aspects of this chapter have previously been published in Reitmaier et al. (2010) and Reitmaier et al. (2011).

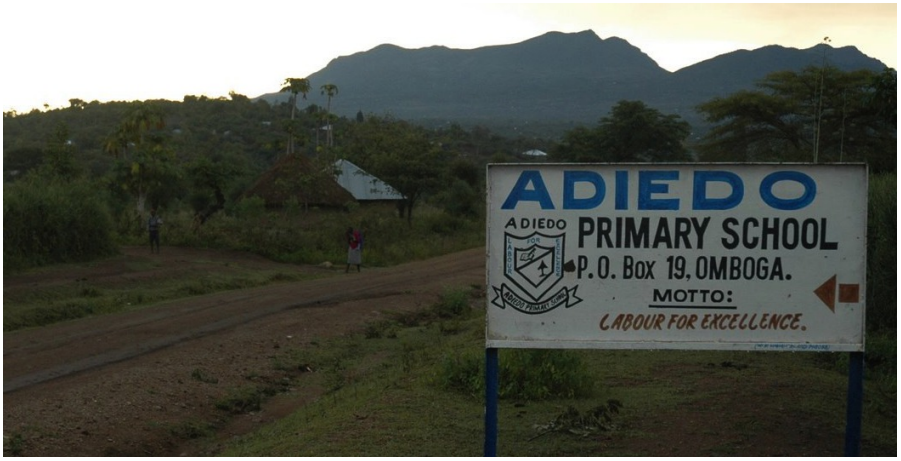


Figure 11: The rural Kenyan village of Adiedo.

we gained from Adiedo with those we gained from communities in South Africa, to further our goal of designing a storytelling system that is sensitive to rural African communities and users.

Here, we describe and reflect on the method we used to evaluate and give insights on situated use of a prototype of our mobile digital storytelling system in Adiedo, Kenya. We report on rich data we gained by implementing this method and argue that we were able to learn more about our prototype, users, their needs, and their context, than we would have through other evaluation methods. We look at the usability problems we uncovered and discuss how our flexibility in field-testing allowed us to observe unanticipated usage, from which we were able to motivate future design directions. We also summarize observations of Nicola Bidwell's more casual deployment of our system in Tschani, South Africa.[2] Finally, we reflect on the difficulties we encountered in Adiedo, the perspectives we used to uncover design implications from more tangential observations, and the importance of firsthand experiences and spending time in-situ.

2. Tschani is the village from where we had recruited participants for our design workshop.

5.1 Background

We chose to field test our prototype in Adiedo, Kenya because of existing relations between us and the Adiedo community. Adiedo lies close to Lake Victoria in western Kenya, about 80km south of Kisumu in Rachuonyo District, Karachuonyo Constituency. The adult literacy rate is 58%, compared to 87% in Nairobi, Kenya's capital. Villagers are from the Luo tribe, with subsistence farming being their main economic activity. There is no running water or sanitation, and people collect rain

water from the tin roofs of their mud huts. Grid electricity is not available, so people charge their mobile phones (usually a basic Nokia 1100) at the cost of 10 Kenya Shillings (about 10¢) using elaborate combinations of solar panels and car batteries at duka shops.[3]

3. Duka shops are informal local shops, usually run from a home.

Our existing relationship with the Adiedo community allowed us to focus all our time and energy on field testing our prototype, as opposed to spending time building relationships with the community. We spent a total of seven days in-situ and recruited as research assistant and translator, a young man named Asher Ojuok, who had completed secondary school a few years earlier. He was fluent in English and Dholuo, the mother-tongue of the Luo. The relationship with the research assistant became very important to our work, as he became essential to introducing the prototype to the community. He acted as a form of cultural liaison: re-distributing some of the power relations and addressing some of the misunderstandings that inevitable associate with cross-cultural research.

5.2 Methodology

Like Patterson et al. (2009) we found ourselves in a remarkably different situation than we had envisioned once we had arrived in Adiedo, even though we had been to Adiedo twice before, on two separate one-day visits. But, reflecting about our situation also led us to fundamentally question the aims of our activities in Adiedo. Here we describe how we structured our activities in Adiedo and the rational and constraints behind these decisions.

5.2.1 *Priming*

We had never conducted field work on our own before. But, our secondary exposure to similar work – through the Tshani workshop video and our conversations with Nicola Bidwell – to a degree primed us for our field work in Adiedo. These exposures afforded us different lenses, perspectives, and theories by which we could observe.[4] Our previous exposures also showed us how and what to record in-situ. For instance, while reviewing the Tshani workshop video, we gathered valuable insights through observing body-language; and our conversations with Nicola Bidwell revealed that we should be ritualistic and thorough – in-

4. We have outlined many of these in Chapter 3

cluding even seemingly insignificant observations – while taking and reviewing notes.

In Nairobi, the capital of Kenya, we also sought the advice of a secondary school teacher who teaches courses on oral literature. After we explained our system and how it works, he told us what story types and topics we might encounter in Adiedo. These ranged from traditional tales to more current stories about the drought[5] to Barack Obama, whose grandmother lives in a nearby village. In relating our system to the oral literature classes he teaches in secondary school, he also made us aware of the performative aspects of traditional storytelling. For instance, he asked us if background instruments, such as drums, and tone changes could effectively be captured by our system.

5. A drought had been plaguing the areas surrounding Adiedo at the time of our research.

While the above accounts were invaluable in the field, others proved less helpful. In Adiedo, we initially, and rather naïvely, wanted to evaluate the usability of our system; a principle that is reiterated in many HCI textbooks (e.g. Jones & Marsden, 2006; Sharp et al., 2007) that it has become almost instinctive (Greenberg & Buxton, 2008). Before arriving in Adiedo, we developed a plan of handing out our prototypes to as many villagers as we could, to later interview them about their experiences and the difficulties they may have encountered. We wrongly assumed that the sole goal of our field work was to uncover usability issues.

5.2.2 *Re-establishing dialogue*

Having arrived in Adiedo and finding ourselves in an unfamiliar setting, we could not envision a realistic scenario of how our system would be used by Adiedoens . Reflecting on this fact during our first night in Adiedo, made us rather anxiously realize that the question we needed to answer was not "*is our design usable?*", but rather "*what is our design?*" We realized that we did not know what forms and meanings our design would take on in Adiedo. So we decided that rather than evaluating the usability of our system, the primary goal of our field work should be to find out – in collaboration with the research assistant – how our mobile digital storytelling system would be put into practice. How would villagers interpret digital storytelling?

Revising our principle question and reconsidering the aims of our activities led us to rediscover our research methodologies of reflective and dialogical design, which we outlined in Chapter 3. So, in Adiedo we extended our design dialogue with our intended users by adapting our activities around the question of "*what forms and meanings would*

our system take on in Adiedo?" – or, more practically, asking Adiedo's villagers "*how would you use our system?*"

5.2.3 *Method*

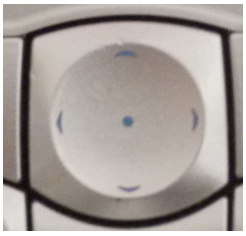


Figure 12: D-pad

In Adiedo, we discovered that our choice of phones, Nokia 6630 and 6680, was unfortunate. When we met the research assistant and trained him and our moped driver on how to use our prototype, we discovered that they had difficulties pressing only the center button of the directional pad (D-pad). Despite the fact that they owned their own mobile phones, they would slip off the center button and press, for instance, the center and right button of the D-pad in quick succession, which would crash the Python interpreter used to implement the prototype.

The above perspectives coupled with the ergonomic difficulties that villagers encountered when using the mobiles that ran our prototype led us to revise our field testing method. Instead of handing out our prototype, with the goal of assessing its usability, to the villagers and collecting them later, we would visit the villagers in their homesteads in a $5km^2$ area around where we were living and then ask them to create their stories, in collaboration with the research assistant, on our prototype.

Once we had familiarized the research assistant with the prototype, he could introduce villagers to digital storytelling and then ask them to create digital stories of there own and assist them in the process. We hoped that this method would allow us to not only uncover usability problems, by observing our prototype being used in different scenarios and contexts, but would also allow us to observe how the research assistant's increasing familiarity with our prototype affected his facilitation and usage – providing us with additional aspects to observe during our relatively short amount of time spent in-situ. We also hoped that this richer social setting[6] would, not only provide us with a rich data set, but also allow us to observe storytelling in more natural settings – helping us to better understand rural, oral users and uncover relationships within the community and between the community and their stories. We intended this method to deliver differing, and more layered, perspectives and interpretations (see Sengers & Gaver, 2006) of our system and mobile digital storytelling, in general – helping us to understand what forms and meanings digital storytelling would take on in rural African communities.

6. *Ramachandran et al. (2007) discuss the benefits of deploying technology in social settings.*

5.3 Realization

The first step of our field test was to familiarize the research assistant with our prototype. On our first day, shortly after meeting him, we taught him how to create picture-first and audio-first stories. He then asked us what would happen if he had recorded a story, but did not have the right pictures. He gave us an example of a story about a beggar; asking us what he could do, if he did not have a picture of a beggar at hand. We encouraged him to answer his own question, and together looked at the example story we had created on the prototype. He saw that the 'add picture' and 'record audio' icons were still visible even after we had 'finished' creating our story and answered that he could probably still add pictures or audio later on. While training him, we also emphasized that there is no good or bad story or right or wrong way to create one.

The basic format of our homestead visits was about the same throughout our time in-situ. To give an impression of how we conducted these, we will discuss three in detail.[7]

7. The participants of these visits gave us permission to share their names, stories, and pictures.

5.3.1 *Visiting Mama Rhoda's homestead*

On our second day in Adiedo we met with Mama Rhoda Auma Majiwa and her grandchild in her homestead. After introducing ourselves, we outlined that the aim of our research was to test and inform the design of our mobile digital storytelling system. We simplified some explanations, such as that we were designing a phone, rather than software, that would be affordable locally in one to two years time. We then asked her if she would like to share a story with us. She told us a tale about the impoverished fisherman Nyamgondo, the son of Ombere, who had fished a woman out of Lake Gwasi.[8] After marrying her, he became very rich and had many animals, but when he started abusing her, she returned to the lake with the livestock following her. At the end of the story she mentioned that the abusive fisherman has now taken the form of a dead tree-stump, which can actually be seen on the shores of the nearby Lake Gwasi. She went on to explain that legend has it that if you beat the tree-stump with a stick, it will start to bleed.

We asked her if she had a more local story; one where pictures could more easily be taken. She immediately pointed towards a calabash, which was standing in front of her house, and got up and started singing and dancing towards it. She then sat back down and started telling us a story about past times. The narrative, as later analysis showed, followed the typical framing of Luo oral literature, where narratives begin and end

8. The same story was sung to us by another villager and has been transcribed by Miruka (2001).

(a) Recording the story's narrative.

(b) Annotating the story with photos.

(c) Synchronizing photos to the narrative.

Figure 13: How Mama Rhoda Auma Majiwa from Adiedo, Kenya recorded her story.

with specific phrases (Miruka, 2001). In her story, she said that her great grandfathers used to drink fermented alcohol from that very calabash while their wives were dancing. She continued her story by talking about the responsibilities of women and children in past and in present times. When she recorded the story's audio (Figure 13a) she did not look at the phone, but instead looked deep into our eyes. She then wanted to add some pictures to the story, which we took since she wanted to be in them. In one picture, she role-played, along with with her granddaughter and the research assistant, drinking alcohol from long straws out of the calabash ; and, in another picture, she demonstrated how women used to grind millet on a stone. Then she restaged her earlier dance (Figure 13b) around the calabash in front of her home. Together with her granddaughter and the research assistant, she then added the pictures to the storyline and rearranged them after listening to the story's audio. During this process, Mama Rhoda and her granddaughter listen to the recorded narrative twice and debated the placement of each picture in the story. Then she stitched the story together (Figure 13c) with the research assistant's help. We then played their final story back to them. Although they had listened to the story's narrative numerous times while creating their digital story, they still visibly enjoyed watching their story. For instance, Mama Rhoda repeated certain segments word for word as they were being played back, and she nodded her head while listening to other segments. We interviewed them about digital stories and our system. She said that she enjoyed creating the story and that the local women's organization, which she is a member of, would find digital storytelling useful, especially if such stories could be shared.

5.3.2 *Visiting Mama Helena Ajwang's homestead*

After visiting Mama Rhoda's homestead, we met Mama Theresa and Mama Helena Ajwang', both widows, later on that day. When we showed them the story that Mama Rhoda had created and they recognized her story and her voice. Mama Helena had problems with her eyesight and was unable to see the photos on the mobile's small screen, which was also full of glare because of the midday sun. Nevertheless, they liked Mama Rhoda's story and indicated that they would go visit her later.

After we introduced ourselves and the aims of our research more properly, Mama Theresa recorded a tale about a woman who was married to a hyena. After more villagers arrived, we played Mama Rhoda's story again, as they were curious about what we were doing. Mama Theresa

(a) Developing a storyline while taking photos.

(b) Taking photos of different activities.

(c) Recoding a narrative suited to the photos.

Figure 14: How Mama Theresa, Helena Ajwang', and other villagers from Adiedo, Kenya recorded their story.

and Mama Helena then asked if they could add 'more features' (photos) to Rhoda's story to make it 'more interesting.'[9] They then proceeded to take their own photos for Rhoda's story, which the research assistant later incorporated into Rhoda's story. While taking these photos, they decided to also take some photos for Mama Theresa's hyena story. The villagers broke out in hysterical laughter when Mama Helena started to feign being a hyena by placing a wooden spoon on her forehead and walking crouched over. Many more villagers joined into these spontaneous and collaborative storytelling activities.

9. As translated by the research assistant.

While the other women and villagers we were taking more pictures, Mama Theresa asked if she could take pictures of the orphans they cared for, who had just arrived home from school. She wanted us to show the photos around in Nairobi. We then asked if they also wanted to tell a story about them. In thinking about stories related to the orphans, the women took photos of themselves (see Figure 14a and 14b), undertaking various activities (farming, carrying wood, cooking, cleaning). They only briefly thought about the general theme of the story (orphans), however, the exact plot of the story only emerged while they were taking photos.

Initially Mama Theresa and Mama Helena wanted to record the story's narrative together, but because of time constraints only Mama Theresa later recorded the narrative. Supported by the research assistant they first added some of these pictures to the prototype's storyline. It was only after she looked through the pictures that she thought of the narrative that matched the plot of their photos and the theme, which she had discussed with the other widows. She then started to record the narrative (Figure 14c) in one go as a series of picture voice-overs. While recording, she transitioned through the pictures, so she could match to each picture a segment of the narrative. Mama Theresa started each picture's segment in the same way: "With the widows …" The story was about the hardships widows face every day and the suffering that the orphans endure because of it. After recording the narrative, we then played the story back to them and the other villagers who had gathered during our activities, three times. We could sense that everyone agreed with the stories message, and Mama Helena was proud to have recorded it. She instructed us to show the story to donors agencies when we return to Nairobi, because she 'thinks it that it would be better if people can see the story.'[10]

10. As translated by the research assistant.

5.3.3 *Visiting Hezron Anyango's homestead*

On our fourth day in Adiedo, we met with Hezron Anyango, who wanted to create a story about his skin and hides workshop that he inherited from his father. He is very proud of his workshop, as it provides him with his main source of income. Hezron owns a basic Nokia mobile phone, which still has the display foil attached even though the phone is not new. He keeps it in a zipper pouch and seems to be quite proud of it. The research assistant facilitated this homestead visit differently. He approached our participant more cautiously, delicately inquiring what the most natural way would be for Hezron to create his story. He provided Hezron with audio-first, picture-first, and hybrid story creation strategies. Hezron seemed a bit confused by this and offered to us that he could record the story in any way we wanted to, but we insisted that he should decide. Hezron and the research assistant ended up taking first a single picture of his workshop (Figure 15a). Looking at this picture prompted Hezron to tell a story (Figure 15b) about different aspects of his business and how selling his skins and hides at the market provided the means for him to build a house and support his family. When we played back his story to him, he realized that he wanted to add more pictures. He then took pictures of his family and business license and asked us to take a picture of him in front of his house (Figure 15c) . He was holding up a hide while gesturing over his home and family to indicate that it was his business that allowed him to build a house and provide for his wife and daughter. One could sense how proud he was of his business. With the help of the research assistant, Hezron then added and synchronized the new photos to the existing narrative (Figure 15d). This process took two attempts, as Hezron did not add the pictures, which he had just taken, to the storyline in the order in which they should appear in the story. Once Hezron and the research assistant had established the correct picture ordering, they synchronized each picture to the corresponding story segment. He was very happy with the outcome of his story and showed the story to his wife and cousins, who live a couple of houses over.

Watching and showing his story around made Hezron realize that he wanted to explain how the workshop was built and how the fence keeps out dogs that are attracted by the smell of the skins. He reused one of the pictures he took earlier and took five more pictures before recording that story. Like Mama Theresa, he transitioned through the pictures while recording, so he could match each segment of his story

(a) Taking a photo.

(b) Recoding a narrative to the photo.

(c) Taking additional photos.

(d) Adding and synchronizing new photos to the existing narrative.

Figure 15: How Hezron Anyango from Adiedo, Kenya recorded his story.

to a picture. When we asked him about the stories that he created, he told us that he liked being able to look at the pictures while recording.

5.4 Results and discussion

In Adiedo, we recorded data using handwritten notes and took 167 photos, most of which featured people interacting with our prototype. Listening and conversing through a translator was beneficial during our homestead visits, as it slowed some of the activities down. This allowed us to focus first on interactions, storytelling technique, expressions, and body language and, later on, on the story's content, which the research assistant translated for us. At the end of each day, we discussed the day's work with the research assistant – looking at photos and stories and discussing interesting aspects in detail, such as why people were laughing when they were listening to a certain part of Mama Rhoda's story. She had mispronounced an English word.

We observed how the research assistant became increasingly familiar with our prototype, which also expressed itself in the way he facilitated each homestead visit. These different scenarios, contexts, and stories uncovered multiple usability issues and taught us many things about users and storytelling in rural settings.

5.4.1 *Story content and creation strategy*

In Adiedo, we collected 15 full stories and eight other stories to which participants were not able to add pictures. The full stories had an average, minimum, and maximum length of 2:50 min, 0:38 min, and 6:44 min, respectively. Stories had between one and 16 pictures and on average 7.73 pictures. For the most part, participants told stories about past times or well-known tales. We got the sense that participants had told these stories before and, hence, preferred to record audio first. For stories that were more spontaneous, such as the widows' story, participants preferred to use a photo-driven approach. That is, participants took photos first, to which they then recorded a voice-over. It was interesting to see how a picture-first approach benefited brainstorming, as was the case when Mama Theresa only thought of the exact narrative after taking 14 pictures and looking at them. We were pleased to see stories being created in different ways, as we later became aware that the structure of our homestead visits might have influenced participants to tell well-

known stories instead of creating spontaneous ones. Hence, most of the digital storytellers adopted an audio-driven approach.

We were fascinated to see that Hezron's story was created in a hybrid fashion, where he first took a picture, then recorded the story's narrative, before adding more pictures. After a few days spent exploring our prototype's features during earlier homestead visits, the research assistant was fairly familiar with our prototype by the time we arrived at Hezron's homestead and was now able to accommodate the different ways in which our participants might like to create a digital story. We concluded that the constant visibility of the 'add picture' and 'record audio' icons of the toolbar affords that a story can be created in different ways. It also showed us that users would stand to benefit from our prototype's flexibility by not forcing them down a strictly audio-driven or picture-driven path.

5.4.2 *Prototype usability*

We discovered numerous usability problems while conducting our field tests, some still in-situ, others ex-situ when going over field notes and photos. The ones we discovered in-situ, we discussed with our research assistant. Since he was the one guiding our participants through the story creating process, he obtained a good understanding of these problems. Being familiar with our prototype and sensitive to local needs and constraints, we could use the research assistant as a proxy, or human access point, into the wider community (Marsden et al., 2008). Together we discussed some usability issues and interrogated and sketched out solutions. This was a delicate process, as he did not harbor the same views towards constructive criticism as we did (Chetty & Grinter, 2007). However, by the time we discussed usability issues we had already been working together for almost a week and a trusting relationship had formed. In our discussions, we conceded that he was the expert – not us – since only he could know what designs would be appropriate for his community. We elaborate on two of these usability issues below and discuss how we addressed these with the research assistant's help.

Most participants favored an audio-first approach when creating their digital stories, so only after they had recorded their stories' audio did they take pictures. Especially for longer stories, we observed how they were unsure about the order in which to add the pictures they had just taken to the storyline. To help the participants with this task we would play back the stories' audio. Unfortunately, our prototype could only

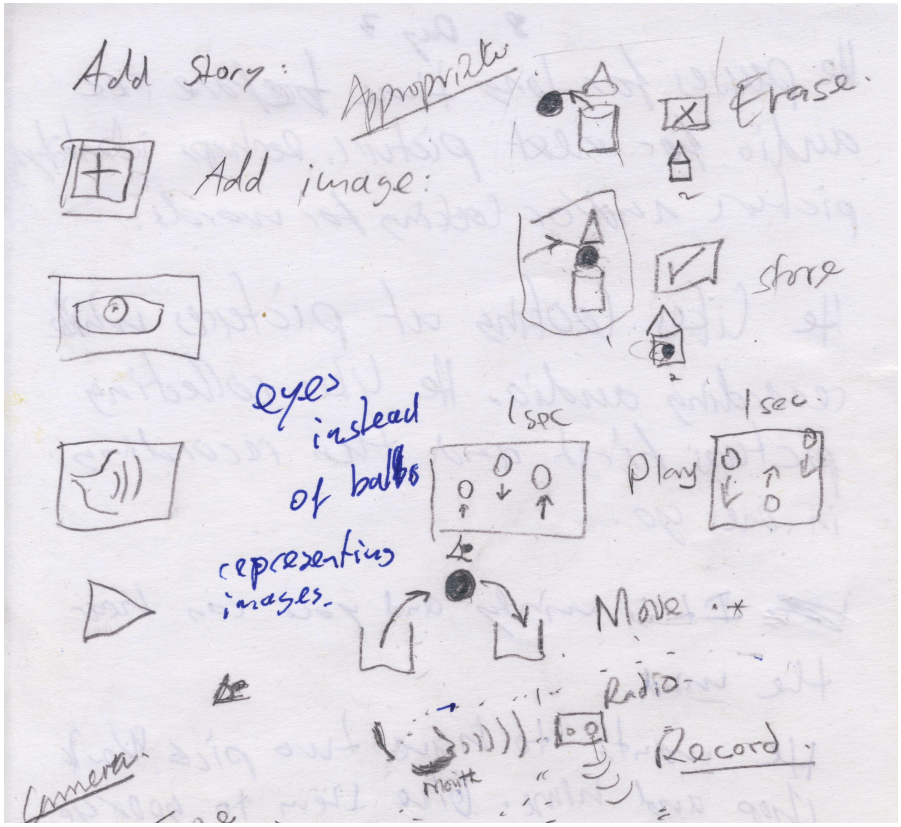


Figure 16: Sketching contextually appropriate icons and interfaces with the research assistant.

playback audio in its entirety. This was not much help; by the time the playback had finished, participants would often forget the intended sequence of the pictures. We improvised by noting down on paper in which order pictures were to be added to the storyline. Together we discussed this issue and came up with the solution that it should be made possible to playback audio bit-by-bit, so that users can iteratively add, rearrange, and transition pictures.

Another issue was our use of contextually inappropriate icons (see Heukelman & Obono, 2009). Participants would struggle to uncover which function could be accessed through a particular icon and sometimes would resort to guessing. Using the research assistant as a proxy into the wider community, we challenged him to sketch-out locally appropriate icons (Figure 16). For instance, we re-designed the round 'record audio' icon. Instead of using the standard record icon from audio editing software (Figure 17), the research assistant suggested we use an icon, which shows a person's head in profile with waves coming from his mouth next to a radio with waves coming from its speakers. He commented that the villagers were familiar with how recorded sounds

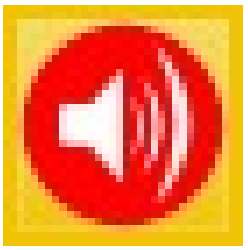


Figure 17: Original icon

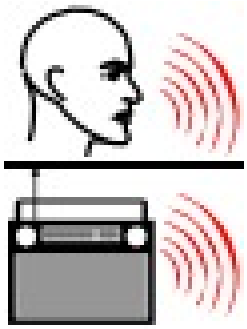


Figure 18: New icon

can be played back on a radio. We ended up agreeing on using an animated version of that icon, toggling three times between the head and the radio when it is selected (Figure 18); in addition, such animation would increase icon visibility. This would also address the usability issue that it can be hard to see which icon is currently selected, especially when recording outdoors in direct sunlight.

5.4.3 *Probing digital storytelling and future designs*

We designed our prototype to allow users to create digital stories in many different ways. This broader range combined with the social setting in which we deployed our prototype enabled us to use our prototype to localize digital storytelling and probe future design directions; it allowed us to observe unexpected usage from which we could gain insights into the relationship between a story, its storyteller(s), and its listeners, and learn more about storytelling in rural contexts.

Locative storytelling

Many of the stories we heard attached to objects or places. For instance, Mama Rhoda's first story about the impoverished fisherman took place at a nearby lake. In fact, at the end of the story, she mentioned that the abusive fisherman has now taken the form of a dead tree, which can actually be seen on the shores of Lake Gwasi. Additionally, we heard tales about how the crater-lake Simbi came to be, or about the origin of a nearby hot-spring. Even when stories did not directly associate with a place, people were often able to recognize a storyteller's voice and could thus associate the story with a homestead.

Collaborative storytelling

Contrary to mobile phone use in Western contexts, in Adiedo the mobile phone is not a personal device. This could clearly be seen by the surprising comfort of our storyteller participants, when a cluster of sometimes 15 people – all trying to catch a glimpse of the mobile's screen – formed around them during playback. People collaborated in many different ways while creating digital stories. A child would often be eager to take, or feature in, a picture for a story recorded by a relative. Another group of storytellers wanted to record a story's audio together, but ended up using a single voice instead because of time constraints. We observed participants wanting to add pictures to another storyteller's digital story.

One participant wanted to amend another person's digital story claiming that his account of how people wore clothing in past times was incomplete. She illustrated the 'correct' way people used to wear clothes with three pictures and about a minute of audio, which we appended to the original story. We heard slightly different versions of the same story and the same story being told once as a narrative and once as a song.

Implications for design

These accounts challenge us to come up with new design directions, which make use of a story's, storyteller's, and listener's location and exploit the mobility offered to us by mobiles. We are provoked to explore how people can better collaborate on stories using one or several mobiles, how we can integrate differing views, or provide the means of accessing alternative ones. We can analyze how such a system might affect social relations. Will it strengthen social bonds as shown by Mama Theresa, who wanted to visit Mama Rhoda after listening to her story, or will it weaken them?

5.5 Field testing in Tschani, South Africa

Shortly after returning from Adiedo, Nicola Bidwell returned to Tschani[11] to probe storytelling with our prototype in a more informal way than in the workshop. She spent two weeks staying in the village and gave the prototype, running now running on a Nokia 6120 and a 6220c,[12] to four young men (aged 17-23) who independently recorded stories. She introduced the prototype more slowly and adeptly then we did, chatting with the young men about phones and music as they came to visit her rondavel or around the pool table at the NPO. The young men spent two days collecting photos and audio around the village or NPO and, independently, stitched together their stories. Afterwards, she video recorded them explaining their stories and their motives to her. The young men gathered 15 stories about activities in the shebeen (local bar), a woman's work, HIV and crime. Though seven of these 15 stories contained only one picture and less than 15 seconds of audio.

11. The village from which we had recruited participants for the design workshop

12. We altered Nicola Bidwell to the poor ergonomics of the phones we used in Adiedo.

5.6 Reflection

Before moving on to the next chapter, we pause for a moment to reflect on and make sense of our activities in Adiedo. We uncover further implications relevant to localizing digital storytelling that lie buried in more tangential observations, which we reflexively 'extracted' from our cross-cultural encounter in Adiedo through reflection. In this section, we hope to illustrate three main points. Firstly, we wish to show that tangential, and seemingly irrelevant, observations can also carry important implications for design. Secondly, we reflect on the importance of first hand experience and time spent in-situ, when designing across cultures. Finally, with this discussion we hope to illustrate the relevance, importance, and power of a reflective approach to HCI4D (Sengers et al., 2005).

5.6.1 *Beyond the interface*

The role of social relations in digital storytelling

As we made sense of our experiences in Adiedo and examined how our cultures differ, we began to see in what high value Adiedons view their social relations; how they spend great amounts of time attending to these, for instance when one bumps into a friend on the way to the shop; and how they share and cooperate in their daily lives. These insights then led us to re-examine the observations we made in Adiedo, paying particular attention to how social relations came into play during our field work. In particular, we began to reflect on why so many of our participants were reserved when they first encountered our prototype, but then performed so wonderfully and naturally when Asher was assisting.

At the time, we also became frustrated with the research assistant, because he was constantly jumping in and trying to help the participants during our homestead visits – 'interfering' with our research and 'messing up' our data. But now we realize that we placed him in the difficult and uncomfortable situating of having to translate between different cultures – attending to us and our goals, while being sensitive to the needs and expectations of the villagers in his community. He was doing what comes natural to him – attending to interpersonal relations. Asher is an intimate part of the Adiedo community, and he knows each and every villager there. For instance during our first homestead visit, we could sense the amount of trust Mama Rhoda placed in him. And she clearly felt more comfortable when he was handling the mobile. When

they annotated her story with photos, they engaged in long discussions about which photos to include and in which order. At no point did she feel that Asher was misrepresenting her. What he so adeptly did was to package digital storytelling tasks into *social relations*. Although Mama Rhoda did not feel comfortable using our prototype on her own, she was able to act through Asher by interpreting and understanding his actions. In effect, he became the holy grail of HCI – the natural user interface (NUI). She did not look at the phone while recording her story, but deeply into his eyes.

Collaboration, flexibility, and ease-of-use

As our design dialogue continues, we now realize that digital storytellers are not necessarily the 'users' of our system. This is a common theme in all of our homestead visits, in the design workshop, and in Nicola Bidwell's deployment of our system in Tschani. Almost all participants in our various digital storytelling activities were eager to include others in their stories. In Tschani, during our design workshop, Kholiswa's group effortlessly passed the mobile back and forth while telling a segment of their story. In Adiedo, the group of widows came up with their story's theme in collaboration and the exact plot emerged only while they were taking pictures of themselves undertaking various chores and activities. And in Tschani, during Nicola Bidwell's deployment, one young man recorded a story about the daily life of his sister. The mobility and flexibility of our system allows users and storytellers to distribute the digital storytelling activities across time, people, and settings. It allowed the group of widows to brainstorm their stories in collaboration and, it allowed Hezron Anyango to append his story with additional pictures of his workshop and home, after realizing that his recorded narrative dealt with subject matters not captured by the first picture. But the flexibility of our prototype also made it somewhat harder to use. During our homestead visits, we saw that villagers had little trouble accomplishing digital storytelling subtasks, such as recording audio or taking pictures. But this was generally followed by a moment were participants were unsure how to proceed – what is the next step? – and looked to Asher for assistance.

We rather anxiously reflected on these conflicting results and were unsure if flexibility was our system's greatest asset or liability. Considering all the design iterations and redesigns our system has gone through over the past years, we felt that our system was at least close to as good as it could get[13] – given the 176×208 pixels, most of which are needed

13. or close to a local maximum

to display photos, and 10 buttons we had to work with. Perhaps, it was naïve of us to assume that the right interface could bridge a cultural, generational, and digital divide. We tried to think of ways in which our system could remain flexible, yet also help guide users – especially those with limited cell phone experience – through the creation process in a way that is similar to how Asher facilitated the homestead visits. But the problem with this approach is that it depends on the story – it is a contextual problem. We quickly abandoned this approach, because whatever effort we put into planning or designing, we can never fully anticipate action (Suchman, 2007). So, we can neither generalize rule-sets nor compute that this is a story that needs to be recorded in such and such a way. That's why scripted approaches are inadequate in rural African contexts and why the flexibility of our system is such an asset. Yet, flexibility still made initial encounters at the interface slightly more difficult.

Looking back and reflecting on what Asher so adroitly did in Adiedo, we realize that the solution to this accessibility problem is not computational, but social. In the field, it is all too tempting to view the user as bound by his or her skin (Hutchins, 1995). But if we look at the context in which action took place, we realize that many people cooperated and collaborated during digital storytelling actives. In Adiedo, Lwandile, and Tschani people have survived for generations by cooperating and helping each other out. The 'natural user interface' that Asher turned into during our homestead visits is the solution to how our system can be made accessible to villagers without prescribing a certain storytelling style. People like him – expert mobile phone users, human access points (Marsden, 2008), or local champions – know their communities, their stories and storytelling styles, and how to interact with them. They can easily interpret and understand each other, in a way that computers cannot.[14] By closely working with the research assistant in the field and through diverse other experiences, we now recognize that deployments of our system should make use of the surplus of human capital and social relations of rural African communities. We posit that it may be sufficient for a few community members to adopt a technology and act as a champion and gateway for the technology – allowing less technology savvy users to slowly learn how to use an unfamiliar technology through indirect and assisted exposure.

14. or at least currently cannot

5.6.2 *On the importance of field work*

We would like to reiterate Medhi's (2007) claim that time spent in-situ is more important than any other particular process. The data we gathered and perspectives we gained while in Kenya are not only invaluable for future designs, but our proximity to, albeit brief, and direct observations of users situated interactions with our prototype helped us to devise a more accurate means to assess our improved prototype's worth through a summative user evaluation. We believe that to improve the design of technologies targeted towards rural users, it is only through time spent in-situ that we can develop the HCI4D methods to shape and evaluate those designs.

To be sure, a common theme during all of our activities in Lwandile, Tschani, and Adiedo is that it is almost impossible not to let our cultural heritage influence our methods, activities, and design decisions – no matter how hard we try. This is perhaps the biggest challenge of designing across cultures. But, we also believe that this does not have to mean that cross-cultural design is a hopeless endeavor. Rather, we should embrace the fact that our user understanding is incomplete and our methods inherently flawed, and use our activities and time spent in the field to further our user understanding. We have shown how we used this perspective to our advantage. By continually questioning our methods and design decisions, we were able to obtain a better understanding of our users, their context, and use of our prototype in that context. This not only allowed us to uncover commonalities and differences between storytelling in different communities, but will also allow us to further refine and customize our prototype to better suit each community's needs and traditions. Although we are encouraged by how well our prototype was able to perform in Adiedo and Tschani – showing the importance of ethnography and user participation in design – we must not allow this to lull us into a false sense of achievement. A design, even if ethnographically informed, is not the end of a cross-cultural design process. It is only the beginning.

6 DEPLOYMENT

Contents

In this chapter, we demonstrate how our system can be made accessible to a community through trusted outsiders and technology savvy community members. We partnered with the South African NGO Centre for Rural Legal Studies and deployed our system in two farms located outside Mossel Bay, South Africa. We argue that this is a realistic deployment of our system and show how we introduced our system to a community of rural farm workers and how they learned to use it. We then discuss and reflect on the results of the deployment.

6.1 Background

In this section, we look at the changes we made to our prototype based on our findings in Adiedo and Tschani. We explain how we gained access to a rural community through an NGO and discuss the partnership we developed with them.

Figure 19: A story is shared from one phone (left) and then opened (center) and displayed (right) on another.

6.1.1 *Our current prototype*

Based on our findings in Adiedo and Tschani, we implemented numerous changes to our prototype. Our prototype now allows storytellers to not only share a story by sending it to another phone, but also to collaborate on a story by incorporating changes made to an original story once it is transferred back to the original phone (Figure 19). Participants in our workshop, and in Adiedo, often managed digital interactions from multiple views around a theme in a co-present way. When participants collaborated asynchronously in Adiedo, they did not interrupt an original linearity to connect various directions from disparate parts, but sequenced them in afterward. For instance, one Mama wanted to amend another person's digital story claiming that his account of how people wore clothing in past times was 'incomplete', rather than wrong. She 'completed' the story by illustrating the correct way people used to wear clothes with three pictures and about a minute of audio, which she requested the research assistant to append to the original story.

Figure 20: Query

We abandoned the changes made to the icons in Adiedo, because we did not want to generalize interactions between localized visual and conceptual metaphors. For instance, the four young men in Tschani, did not have the same troubles using the icons as some of our participants in Adiedo. We improved the transitioning and synchronization interfaces to address the usability issues we discovered in Adiedo. We also implemented changes to the 'remove' and 're-order' functions. Before re-ordering or removing photos, the user is now queried if only the photo should be (re)moved – leaving the audio unchanged – or if the photo along with it's corresponding audio segment should be (re)moved (Figure 20). When the user moves the selection box over the (re)move photo with audio option, the corresponding segment of the story is also

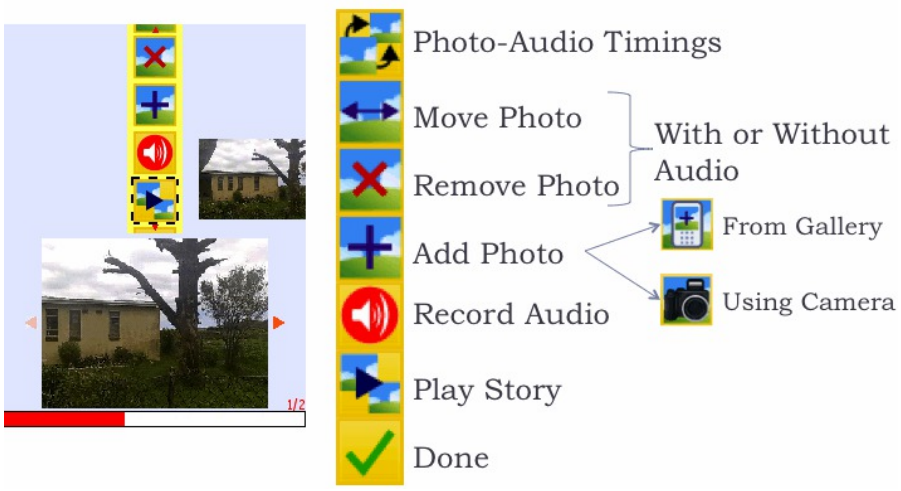


Figure 22: Overview of the storyboard interface of our most recent prototype.

played back to help illustrate this feature. We also addressed numerous stability issues and improved the functionality of the built in camera, so users can more easily use the camera from within our prototype. The picture that is taken from within the prototype is then automatically added to the storyline. We also improved the toolbar interface; instead of just showing arrows, it now also shows partially obscured icons to indicate that functions out of view are also accessible by pressing up/down (See Figure 22 and Figure 21).

Figure 21: Toolbar

6.1.2 *Gaining access to rural communities*

Ideally, we would have liked to return to Adiedo or Lwandile to evaluate our improved system using the metrics and strategies, which we started to develop in Adiedo. Unfortunately, we could not budget a flight to Kenya and did not have access to the Lwandile community without Nicola Bidwell, now working in Pretoria. Instead, we approached Sally-Jean Shackleton of Women's Net and Jennifer Radloff of APC Women, who hosted a digital storytelling workshop, which we observed in Cape Town.[1] We gave a demo of our prototype at a dinner they hosted as part of another workshop, in which they invited members of mostly feminist NGOs across Africa. In relating our prototype to their initiatives and the rural and urban communities they work with, they saw value in mobile digital storytelling. This was also expressed in the relative ease in which they could imagine usage scenarios. They even asked us how they could install such an application. We had to explain to them that our system

1. See section 4.1.1.

is only a prototype, and it currently runs on only four types of mobile phones.

We asked Sally-Jean Shackleton, the host of the workshop, if she knew of a local NGO that could help us deploy our system in a rural community. She then introduced us, via email, to the head of the Centre for Rural Legal Studies[2] (CRLS), Sharron Marco-Thyse.

2. http://www.crls.org.za/

6.1.3 *Meeting the Centre for Rural Legal Studies*

A few weeks later, we met Sharron and five of her colleagues at the head office of the CRLS in Stellenbosch. The CRLS use participatory rural appraisal (PRA) methodologies to promote and protect the land and labor rights of women and men farm workers across Southern Africa. The purpose of this visit was to introduce the possibilities and benefits of mobile digital storytelling to the NGO. In the email exchanges prior to our visit, Sharron expressed interest in using digital storytelling with the rural farm worker communities they work with. By meeting with the CRLS, we hoped that we could develop a mutually beneficial deployment strategy, in which they could help us gain access to rural communities and, in return, they could experiment with mobile digital storytelling to see how digital storytelling could be integrated into their line of work.

To get us thinking about storytelling and to get to know each other better, we began our meeting with a small storytelling exercise in which everybody told a story that ended with the sentence "… and that's how I got my name." This exercise revealed aspects of our cultures and personalities that some of the NGO members did not know about each other, and which helped us form trust and gave us a concrete illustration of how much meaning even simple stories can hold. We then gave a small presentation on our prototype and our field work in Kenya, so they could get an impression of our system and how people might use it. We particularly emphasized how our prototype can accommodate different storytelling styles and gave examples of how Mama Rhoda, the group of widows, and Hezron Anyango created their stories in Adiedo.

We then handed out four mobile phones that ran our prototype, so the staff members could experiment with different storytelling strategies (Figure 23). We walked around the large table we were sitting around and helped out whenever someone encountered difficulties. For instance, one person had added a couple of pictures to the prototype's storyline and started to record a short story segment to each picture. When he played back the story, he was initially confused because the story was

Figure 23: Training CRLS staff members to use our system.

playing back in the wrong order. He then saw that the prototype was playing back the story in the order in which the pictures appear in the storyline and not in the order in which he recorded each segment. He was able to establish the correct playback sequence, by re-ordering the pictures on the storyline. Save for the above conceptual model mismatch, which the participants quickly identified and rectified, the staff members felt comfortable using our system. They also indicated that the communities they work with would also quickly learn how to use the system – especially those who own mobile phones.

We then engaged in an hour-long discussion on digital storytelling. The staff members talked about the ways in which mobile digital storytelling could improve the dialogue between the CRLS and rural farm worker communities. They debated if the issues that farm workers might discuss in their digital stories can be considered as facts or evidence. They agreed that such digital stories provide an understanding that would need to be independently researched to ascertain the facts. They were intrigued by the possibility of bringing the voices of the communities that they work with to the foreground: to raise awareness, to show the stories to government and municipalities, and to use their voices to fund and further the CRLS's cause. Sharron then pointed out that we were perhaps getting carried away in our discussion. While mobile digital stories provide a means to communicate a situation, they can still be disputed; the device, as she correctly assessed, is just another tool in a line of many. 'It won't solve all problems.'

One staff member was particularly concerned with the unintended consequences a deployment of our system may cause. He discussed the power relations that exist between worker and employer, men and

women, husband and wife, young and old. He was worried that handing out feature phones might cause people not involved in the deployment to become jealous, or that taking pictures and recording stories in front of the employer or labor broker might turn confrontational or cause the worker to lose his job. He claimed that many farm owners are not particularly fond of the CRLS and that the owners do not want any bad publicity. In light of these discussions, the CRLS decided that they would have to closely monitor digital storytelling activities.

6.2 Developing a realistic deployment

In this section, we develop a realistic deployment strategy. We draw upon the experiences we formed in Adiedo, Lwandile, and Tschani; the NGOs we talked to; and the constraints that make deploying our system as well as future systems difficult.

6.2.1 *Localizing the deployment*

In Adiedo and Tschani, we discovered how some digital storytellers never encountered our interface directly. Rather, they acted through, or in coordination with, the people using our system. This was not merely the case if participants had trouble, or were reserved about, using our system. In general, participants were eager to draw others into their digital storytelling activities. So any realistic deployment of our system must allow users to draw upon their social context. But they must also encounter the interface in a natural form. We draw upon our experiences in Adiedo to show how first encounters at the interface can be made more natural and accessible.

Samuel Owiti of Adiedo is a retired primary school teacher. He lives and farms on the plot of land that he inherited from his father. Locally he is known as a great farmer. After speaking to Samuel about his farming and collecting two stories about modern and ancient farming techniques, he took us on a tour of his fields. He was particularly proud of his most recent farming experiment. He is currently experimenting with cover crops[3] to see which type is most effective in Adiedo. He started planting cover crops after talking to a member of the Kenya Agricultural Research Institute. He hopes to conclude this experiment soon, so he can introduce cover crops to other Adiedons. He said that he

3. Cover crops are crops planted primarily to manage soil fertility.

plans to explain what their benefits are and how they should be planted and cared for.

In taking over, we also saw how Asher was introducing our system to villagers in Adiedo. He slowly introduced digital storytelling and our system by engaging with the participants in long dialogues. He patiently showed those unfamiliar with camera phones how to take pictures, for instance by waving his hand in front of the lens to show that it is the lens that 'sees the picture.' Asher took a more hands off approach with participants who had experience using mobiles. Whereas with participants who were unfamiliar with mobiles, Asher often created the digital stories on the participants' behalf, but always in dialogue.

The above two paragraphs illustrate how new technologies and methods can be introduced in rural African communities. We have seen how one person can adopt a new technology and act as a bridge into the wider community, and how another person can champion a new method by experimenting on his own before introducing the wider community to the method and benefits. What both scenarios have in common is that they make extensive use of the social networks[4] and sense of unity of rural African communities. So, in our deployment we need to identify and take the time to train key individuals who can then use their technical and social expertise to introduce our system to other community members.

4. See also Bidwell (2010)

6.2.2 *Constraints posed by mobile phones*

The mobile phones that are used in rural communities all over Africa come in all shapes and sizes. In Adiedo, we asked the owner of a local duka shop,[5] where villagers come to charge their mobiles, to make a list of the makes and models of the mobiles that he charged during our stay. Looking over this list, we can see a severe fragmentation of the market. While this has driven down the prices of mobiles, it has also made developing applications considerably more difficult. Developing our application with the widely supported J2ME is unsuitable, because our application needs to access functions, such as the file system, gallery, and camera, that are inaccessible from within the J2ME sandbox environment. This forced us to developed our prototype on the Symbian Series 60 operating system (S60), the most prevalent OS for feature phones globally. But different versions of the operating system, and the hardware that runs them, have made the development of our system more of a customization process. For instance, on one phone the key-

5. Duka shops are informal local shops, usually run from a home.

code of the shutter-key is `0xf883` and on another it is `0xf849`.[6] Even if we could have developed customized versions of our software to run on a broader range of phones, there are still many hurdles that need to be overcome to make mobile internet accessible in Africa (Gitau et al., 2010). So, to assume that users in rural African communities would somehow download and install our application is unrealistic. There is no App Store in rural Africa. As a consequence, people living in rural African communities would more likely first encounter our system in a more indirect manner. So, in deploying our system we should ensure that community members are first exposed to our system in an indirect manner; for instance, by watching others create digital stories or by letting proficient users assist them in creating their own stories. These constraints also show that any realistic deployment would probably be through an NGO.

6. This simple inconsistency is merely an example. We encountered many, more profound difficulties in porting our system to different versions of S60.

6.2.3 *The role of NGOs*

We have met and talked to members of many NGOs during the course of our research. Reflecting on the discussions we had, we come to realize that they form the missing link to how our system could be deployed. NGOs are trusted and accepted organizations who play an instrumental part in Africa's development agenda (Gitau & Marsden, 2009). After talking to NGOs such as CRLS or APC Women, we recognize that their social networks not only reach well into rural African communities, but also among NGOs and various funding bodies. Thus, we believe that NGOs are the key to a realistic deployment of our system. Some are already involved in digital storytelling activities and are busy spreading the practice. And more than the communities they work with, NGOs have the budget, internet connectivity, and know-how to purchase a few mobiles and install software on them. In addition, some of the NGOs we have spoken to have expressed interest in mobile digital storytelling software, or could, at least, relate digital storytelling to their initiatives. Because NGOs have worked closely with communities, they understand their needs and can identify and work with key individuals in those communities. For instance, in Adiedo the Kenya Agricultural Research Institute identified and worked with Samuel Owiti, a man who is locally know as a great farmer. As we have argued above, these individuals could then further spread mobile digital storytelling within their communities. In Brazil, Clarke (2009) trained and leveraged 'story agents' – a concept that is similar to our use of key individuals – to spread the practice of

digital storytelling. Marsden et al. (2008) also claim that finding such people in a community is no unique occurrence.

6.2.4 *Deployment method*

We used the problems we had gaining access to rural African communities and the insights we gained from the meetings we had with the CRLS to reflect on and design a realistic deployment scenario for our system. In our subsequent e-mail exchanges with the CRLS we discussed how we could deploy our system together in a fair partnership.[7] The CRLS were eager to collect stories from the farmers to see how they could use the farmers' stories in their initiatives. In particular, they wanted to show the stories to their board of directors. In turn, we wanted to observe how our system was being deployed, how community members encountered the interface, and how they created their stories. In our e-mail exchanges, we also asked the CRLS to identify key individuals in the field that could be trained to use our system more independently. We told the CRLS that a more natural encounter of the interface would be to first indirectly expose potential users to mobile digital storytelling before handing over our system completely. But we also said that we were happy to follow the NGO's judgment, especially in regards to the safety concerns they had expressed during our first meeting. We agreed that together we would drive out to some farms near Mossel Bay, South Africa, to identify and train key individuals, who with the CRLS would introduce the farm workers in their communities to our system. In return we would also produce a DVD of the stories we collected, for them to show to their board of directors.

7. See Gitau & Marsden (2009) for a discussion on working with NGOs.

6.3 Deployment

In this section, we describe how we deployed our system, together with the CRLS, in two communities of farm workers near Mossel Bay, South Africa. We begin by describing how we met Celeste, a member of the CRLS, outside of Mossel Bay to discuss our deployment. Then we discuss how we trained key individuals in one community of farm workers. Finally, we report on how they and the CRLS then used our system on their own and how they introduced their families and other farm workers to mobile digital storytelling on two farms.

We met Celeste at a gas station just outside of Mossel Bay to discuss our deployment before driving to the farms. Two students from our Research Centre, Raymond and Christopher, came along to help take notes and photos. We had first met Celeste at the head office of the CRLS in Stellenbosch, so we had already trained her to use our system. We also left one mobile that ran our prototype with Celeste after our workshop in Stellenbosch. We gave another overview of our prototype's key features, but quickly realized that Celeste had been experimenting with our system on her own and was by now a proficient user. Celeste then told us about her work and the issues and problems the farm workers face: abuse from farm owners, exorbitant prices for common groceries at the farms, alcohol abuse, and violence. She mentioned that one farm worker, who was supposed to take part in our deployment, was assaulted by the farm owner and could not participate.

6.3.1 *The first farm*

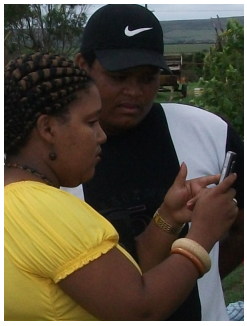


Figure 24: Training

At the first farm, Celeste introduced us to Elvin and Christian – two farm workers who are proficient mobile phone users. Because the workers were busier than we had expected, Celeste asked us to show Elvin how our system worked, while she explained it to Christian (see Figure 24). We discussed with Celeste how she would explain the software and in which order she would introduce the different story creation strategies. We then followed her explanations while we trained Elvin. So just like Celeste, we emphasized that users need to associate photos to audio when recording audio first, but that our system can deduce these associations when photos are taken first. While we were training Elvin, we paid particular attention to how Celeste was training Christian, so the training was at least similar. Together we explained audio-first, photo-first, and hybrid story creation strategies. We then also explained editing features such as rearranging and removing photos, as well as how to launch and exit the application. Elvin and Christian then created some stories of their own and indicated to us that they were comfortable using the application. In relating our system to his work Elvin, who deals with labor disputes, thought that farm workers will be able to easily use the application to record any issues they face on the farm so that he can then collect the stories and take any necessary actions. We told Elvin and Christian to use the application in a way that they deemed sensible and encouraged them to teach others around them how to use our application. We then split up; we followed Celeste, and Raymond and

Christopher – the two students who came with us – followed Evin and Christian, respectively.

CELESTE adopted a journalistic recording style; she walked around the house and garden of one lady and took photos. After each photo, she would prompt the lady to say something, for instance by asking a question. The story they recorded in this way was five minutes long and contained nine photos. The story revolved around the water shortages the workers have been facing on the farm. For instance, one photo showed a big pile of laundry, to which the women explained that she is not able to wash her family's clothes because she is scared that she will not have enough water left to care for her infant. In another photo she stands in front of a big water tank, which collects rainwater from the roof. In that photo's audio, the sound of the empty, hollow tank can be heard as she taps against it while explaining how her family is not able to collect enough rainwater.

ELVIN first walked around and took some pictures before walking inside of the home of an elderly resident. Before recording a story, however, he sat down next to the elderly man to explain digital storytelling and gave a basic overview of our system. He encouraged the man to record a corresponding story on his own, but he said that Elvin should help him. Together they then recorded the story, each saying something to each picture before transitioning to the next. Elvin then played back the story, and both were happy with the result. The man said that he liked the application and could see how the application works, but said that he would rather enlist the help of his son, who owns a mobile phone, before creating a story on his own.

CHRISTIAN walked around the farm for a bit after we split up and took two photos. Instead of recording a story in his voice, he visited a lady in her home and asked her if she could record a narrative. He showed the lady our prototype and the photos he took, and he explained how our prototype associates voice recordings with photos. The lady was very happy to be included in our activities, and she began telling a story about the water shortages they have been experiencing. As Christian was taking a couple of more photos, the lady continued her story. On our prototype, Christian was not able to keep up with the lady's storytelling. But Christian was not comfortable interrupting her, so he let her finish before explaining that he was not able to record. They took a couple of more photos and associated narrative to those photos, before returning to the photos that were still missing narrative. The lady did not mind retelling the missing parts. Together, they then walked outside of her home and showed the story to other people. Both were happy with the

story they created. Christian said it was easy; while the lady agreed with Christian, she also said that it would probably take her a bit more time to learn.

Unfortunately we could not stay longer at this farm, as Celeste explained to us that the people here had to return to work. Elvin, however, accompanied us as we drove to another farm.

6.3.2 *The second farm*

At the second farm we met an elderly man, a disabled man, a women, and three kids. We again split up and watched Celeste and Elvin train and engage the people at this farm in digital storytelling activities.

Elvin took the same storytelling approach as he did last time and walked around the area to take some photos. He then showed the elderly man how to record a narrative around the eight photos he just took. After Elvin moved past the third photo, the elderly man more actively joined into the activities and added some words to Elvin's story. Elvin then asked the man if he would like to create a story all on his own. Elvin handed him the phone and began giving him instructions on which buttons to press to take photos. As the elderly man had trouble walking, they stayed in one place and took photos of the house the man lives in and the surrounding fields he used to work in. The man did not have much experience with mobile phones, and he held the phone with both hands. After they had taken some pictures, Elvin showed him how to record audio and transition. When the man tried for himself, he started his recording with the last photo he took and could not move backwards. When Elvin realized this, he told the man that he had to start with the first picture. Elvin gave the man instructions on how to stop his recording and move to the first picture. On his own, the elderly man then pressed the record button and recorded his story while transitioning through the photos. Elvin then showed the man the location of the play-story button on the toolbar by saying 'na ondertoe, na ondertoe,' the Afrikaans word for down. The man was happy with the story he created and said that with a bit more practice and help from Elvin, he could see himself creating digital stories on his own.

Celeste spoke to the woman, who lives in the house in front of which we parked our car. The woman was telling Celeste about the trouble she was having collecting the pension of her recently deceased husband. Celeste then suggested that the woman should tell a story about her troubles, so she can show it to her colleagues at the crls.

Figure 25: Deploying our system at a farm near Mossel Bay, South Africa.

Celeste took a picture of the woman and then began recording her story. In telling her story, the woman decided to show Celeste the ID card and death certificate of her husband, which she had talked about in her story. Celeste then took photos of the documents, but instead of integrating those pictures into the already recorded story segments, Celeste prompted the women to tell her more about these documents. She recorded what the women had to say about the documents and assigned the recording to the appropriate pictures of the documents.

While Celeste was giving advice to the woman and talking to other people on the farm, a young girl approached Elvin and wanted to take part in the storytelling activities that she had been observing from inside of the house. Neither she, nor her family owns a mobile phone, but she said that she likes to play with the phone of her friend at school. She was intrigued by our system, and she only needed little instruction from Elvin to learn how to use it. She took a couple of pictures of her home, her brother, and his friend. She then went on to tell a short story about the pictures she just took. She mentions her brother and his friend by name in the story and in the recording their giggling can clearly be heard. They all laughed while they watched the story. The young girl liked the capabilities of our system and enjoyed recording her story.

The disabled man also wanted to record a story of his own and asked Celeste, who was still talking to the woman, for the mobile she was using. Celeste gave the man a quick overview of our system, before returning to her discussion. The man wanted to include some music in his story, so he turned on his radio. He took some photos of the surroundings and the kids that had gathered around him. He too liked our system and

said that it is more useful than just a camera. In particular he thought that disabled people would benefit from such a system by being able to share their stories. But he also thought that it would be fun to take it to a sporting event.

6.4 Results and discussion

In the two farms near Mossel Bay, we were able to observe eight stories being created. Only three of these, however, were created with little help from Celeste, Elvin, or Christian – the story agents.[8] The other five stories were created or stitched together by the story agents, but captured the narratives and photos of the people they were engaging with. We were eager to observe more stories being created, especially those involving farm workers and their families using our system on their own, but unfortunately this was not possible. We asked Celeste if we could leave our mobiles with the farm workers at the second farm to collect them the next day, but she was worried about the safety implications – perhaps thinking about the earlier discussions we had at the CRLS head offices.[9]

8. *See Clarke (2009)*

9. *See section 6.1.3.*

The observations we made and the feedback we obtained show that our system is usable and useful. Our results indicate that a few key individuals or story agents can quickly be trained to use our system. In adopting the technology they can also act as champions and gateways for the technology in their communities. The way Celeste and especially Elvin and Christian engaged older, less technology savvy individuals in digital storytelling activities leads us to conclude that the social nature of mobile digital storytelling and our deployment of it can make the practice accessible to a wider community. Although, we must also note that encounters with mobile digital storytelling, especially when mediated through outsiders, invariably carry with them expectations about story content and storytelling style. This was clearly the case in our deployment, where storytellers tended to mimic the photo-driven storytelling style of Celeste and mostly told stories that were relevant to the CRLS. So we must concede that the deployment of our system was not as flexible as we had hoped and, perhaps, was centered too much on the story agents' usage. But such shortcomings will inevitably be a part of any deployments, where different cultures and languages, power relations, and expectations come into play.

This also makes drawing comparisons between Tschani, Adiedo, and Mossel Bay problematic. Although these communities share many characteristics, they differ in terms of there culture, language, and location.

In Adiedo, the research assistant introduced our system more slowly and seemed more adept at choosing when he needed to make a suggestion or take over and when he could step back. On the farms, the story agents incorporated others in their storytelling activities more hastily – sometimes putting them on the spot. Perhaps, these different adoption patterns are influenced by the community's proximity[10] to Mossel Bay and urban life. Having never been to Mossel Bay before, we might have also disrupted activities more than we did in Adiedo, where we have been twice before. Forming relationships and trust are crucial elements that make observing more natural encounters at the interface possible, but are aspects that, at times, we too have relegated to the background when focusing on cycles of designing, prototyping, and evaluating.

10. The farms were about 50km outside of Mossel Bay.

We are, however, encouraged by how the young girl and the disabled man made use of the software towards then end of the deployment. For instance, after the grown ups on the farm had used our system, the young girl was eager to give it a try and told a story not about water shortage, but about her brother and his friend. Likewise, the disabled man experimented with the device by recording his story over the music that he blasted from his radio. So while the deployment shows that our mobile digital storytelling system can be made accessible to a larger community and can be used in the context of an NGO's work, our deployment also indicates that people interpret our system differently and are willing to re-appropriate our system towards alternative ends.

7 CONCLUSION

Contents

With this research, we aimed to situate digital storytelling by designing a mobile digital storytelling system that suits the needs and functions of rural African communities. The biggest challenge posed by this type of design research is that the artifact itself seeds its usage. So it was only after we built our prototype that we could begin to see how communities actually interpret and make use of mobile digital storytelling. Our cross-cultural research agenda exposed paradoxes and dilemmas in participation, as we found ourselves wanting to design storytelling software using methods that are profoundly influenced by our Western storytelling traditions. By framing our design dialogically, grounding our methods in ethnography and ethnographic observations, and making use of probing approaches, we were able to expose ourselves to rural African interpretations of digital storytelling. In this chapter, we summarize our understanding of this interpretation, answer the research questions that guided our research, and highlight our contributions. We then suggest possibilities for future work.

7.1 What is digital storytelling?

The stories that we tell are an intimate part of our identities, and in rural African communities identity is formed in ubuntu.[1] Canon John Mbiti insists that the cardinal point to understanding *ubuntu* and the African view of humanity is "I am, because we are; and since we are, therefore I am" (Mbiti, 1990, p. 106). In designing technologies, and

1. In African Bantu languages ubuntu loosely translates to 'humanity.'

especially storytelling technologies, for rural African communities this perspective of an individual forces us to shift our unit of analysis beyond individuals and the buttons they press on the interface. As we lift our gaze beyond the interface and the individual interacting with it, we can see that our system often only played a minor role during our deployments. For instance, the group of widows in Adiedo spent much more time gathering ideas and taking pictures (about one hour) than they spent actually recording and stitching their story together (about 10 minutes). As we shape our understanding of digital storytelling in rural African contexts, we are forced to ask ourselves if digital storytelling is solely about the end product – the digital story – and the individual telling that story? One of our key findings on digital storytelling in rural African contexts is that unlike digital storytelling in the West, which is more about individuals telling some aspect of their lives (see Lundby, 2008), a rural African interpretation of digital storytelling is also about creating digital stories with others. It is about maintaining and creating social relationships through storytelling activities.

Our activities in different communities across Africa also point towards a broad interpretation of digital storytelling. From the digital stories we collected, we can see that digital storytelling is frivolous and serious; causes consensus and debate; fosters free speech and censorship; is earnest and funny; concerns the individual and the community; is planned and spontaneous; is confrontational and integrating; is true and fictional; is collaborative and individual; and is about the past, present, and future. Crucially, it is not for us, as designers, to decide what constitutes a valid story and what does not. It is not a problem to be solved, but an ambiguity that should be accepted and embraced.

7.2 Research questions

In this section, we revisit the three research questions we formulated in section 3.4 and summarize how we addressed these questions in our research.

1 *Can an interpretively flexible mobile digital storytelling system be designed that accommodates the oral culture and context of rural African communities?*

In our discussions with NGOs and in our activities in the field, we have seen that people have interpreted our mobile digital storytelling

system broadly – both in the stories that they told and how they created them on our system. In exploring pragmatic design solutions that "do not require adding more technology or infrastructure to a situation" (Marsden, 2008), we targeted the mobile as our storytelling device. In turn, the *mobility* and *flexibility* of our system proved to be the two key properties to how our system accommodates context. Mobility and flexibility allows users and storytellers to distribute storytelling activities across time, people, and places. These properties allow people to draw upon their context – their physical and social surroundings – in telling their stories. For instance, Hezron Anyango created a story about his leather workshop in his workshop. Or the group of widows who drew upon their physical and social surroundings in developing their story. They engaged with each other and the props (pots, brooms, firewood, hoes, etc.) they collected in their homesteads to develop and illustrate the story they told about the hardships orphans and widows face. And Mzee Ogot recorded a story about the inter-tribal fighting of past times, which his grandsons later annotated with photos by posing with machetes and spears. When people took photos first, they often used the photos to help them synchronize their narratives. So, it is the context in which activities took place, more than the photos that participants took, that inspired storylines.

Our system accommodates context through mobility and flexibility, but also by not trying to specify context; for instance, through generalizing strict rule-sets of photo- or story-driven approaches.[2] Instead, our system gets rid of the artificial division between photo- and story-driven approaches and allows users to switch between approaches or develop hybrid approaches. In addition, our system provides storytellers with the opportunity to develop their digital stories in context and in different contexts – allowing the story to be recorded, annotated, appended, and edited in different places, with different people, and at later times.

2. See Balabanović et al. (2000) and Reitmaier & Marsden (2009).

2 *Can this system be leveraged as a probe and uncover implications with regard to usability, digital storytelling in rural context, and future design directions?*

We can learn a lot about people by listening to the stories they tell. While we analyzed the Tschani workshop video and the products of that workshop – the photos that participants took, the stories that they told, and the digital stories they created – we realized that we were eliciting more than just strict design requirements. These 'by-products' gave us glimpses of the participants' personalities, culture, and values

and helped foster an empathetic relationship. The value of storytelling to HCI practice is widely accepted, so by designing a mobile digital storytelling system that is situated in rural African context, we were eager to explore if the system also allows rural Africans to also express themselves in design, both directly and indirectly. Our activities in Adiedo, Tschani, and Mossel Bay have confirmed the value of mobile digital storytelling as a design tool. In section 5.4.3 we outlined some of the design implications, such as locative and collaborative storytelling, that we uncovered by deploying our system as a probe. The stories and photos we collected reflect their locale and reveal social relations and protocols, such as deference to elders. In chapter 6, we have shown how valuable these more subtle, contextual observations are to designing and localizing deployment methods.

Leveraging our system as a probe in Adiedo also allowed us to give more structure to our activities. The probe provided an anchor point – in a culturally and geographically remote area – around which we could observe storytelling activities. Because the social practice of storytelling interweaved with usage of the probe, we were able to relate many of the observations we made to technology usage, and thus we could more easily uncover and motivate design implications by relating them to concrete observations. This allowed us to bridge some of the difficulties designers encounter when translating social observations into digital designs.

3 *Can such a system be made accessible to people living in these communities without prescribing a certain storytelling style?*

Having returned from Adiedo, we posed this question because our system's flexibility seemed to stand in conflict with its ease-of-use. It was, at the same time, our system's biggest asset and biggest barrier. As we concerned ourselves with the question in the months that followed, we looked into scripted approaches, help systems, and narrowing the scope of our project to consider only certain story types or to target only younger audiences. But, we felt uneasy limiting our system, especially when we considered how important the broad range of our system – enabled in part through flexibility – proved to be in Adiedo. Storytelling is a complex phenomenon. Pushing our design through numerous iterations and re-designs has ensured that our system is not unnecessarily complicated, but it still is complex – in the sense that it "match[es] the complexity of the world" (Norman, 2011, p. 265).

At the time we posed the above question, we did not know that the answer was embedded in the experiences we formed in Adiedo. As we

lifted our analytic gaze beyond the interface and examined how our cultures differ, we began to see in what high value Adiedons view their social relations. This caused us to re-examine the experiences we formed, and the observations we made, in Adiedo – focusing on how social relations came into play during digital storytelling activities. We now realize that for various reasons[3] the answer to this accessibility problem is not computational, but social. In our field work in Adiedo and during our deployment with farm workers near Mossel Bay, individuals liked mobile digital storytelling and were happy to engage in a partnership with us or with an NGO to learn how to use the system. While some participants were initially reserved about our system, others – especially those who already own mobile phones – were willing to learn, and all were eager to participate. The more proficient users of our system also became story agents and acted as gateways for the technology into the wider community. In adopting our system, Asher – the research assistant in Adiedo – and Christian and Elvin – the story agents in Mossel Bay – turned our system into something simple, meaningful, and accessible. Through their social expertise, developed over a lifetime of living in their communities, they engaged other community members in digital storytelling. This allows less technology savvy users to encounter our system in a more indirect and natural form, and through this process, as our results in Mossel Bay and Adiedo indicate, others can learn to use our system. While story agents might prescribe storytelling styles, this is less problematic because, unlike computers, they can interpret and understand the needs of the people they are engaging with, the stories they want to tell, and their unique situations. Through this understanding, story agents can then show others how they can record their stories.

3. See section 5.6.1 for a more detailed discussion.

7.3 Summary of contributions

In this section, we summarize the contributions of our research. We subdivide these into contributions regarding digital storytelling and those regarding cross-cultural HCI.

7.3.1 *Contributions regarding digital storytelling*

We found that our mobile digital storytelling system is an appropriate technology for rural African communities. And we have seen that such systems can neither be designed, nor deployed in isolation. The per-

spectives we used, which arose out of ethnography and our activities in rural communities across Africa, allowed us to situate the design and deployment of our mobile digital storytelling system in rural African communities and their ways of doing and saying. In such a context, it is essential that storytelling systems accommodate different storytelling styles and allow users to draw upon their physical and social surroundings in developing and recording their stories. The stories that participants created, and how they created them, strongly reflect social relations and identity formed in ubuntu. These observations point towards a rural African interpretation of digital storytelling that is distinctly different from digital storytelling practices in the West.

7.3.2 *Contributions regarding cross-cultural HCI*

Our research touches upon issues beyond the design of specific interfaces. We have explored how HCI methods are located in Western culture and built upon our storytelling heritage. Faced with these challenges, we show the importance and relevance of a reflective and dialogical approach to design in cross-cultural HCI. In collaboration with Nicola Bidwell, we devised a method to explore storytelling in a more nuanced way. Though user understanding is often inherently unfinalized in cross-cultural research endeavors, we have demonstrated how we can use formative, explorative field studies to enrich our dialogue with users and understand the phenomena surrounding a new technology from which we can draw valuable implications to localize and shape designs and methods. Finally, we have shown how we can overcome the difficulty of designing technologies on top of unfinalized understandings by designing flexible technologies, that users can appropriate according to their needs, even if we do not fully understand these in advance.

7.4 Future work

The investigations described in this thesis show scope for future work in this field of research. Our design is, but, a temporary finalization of our understanding of digital storytelling in rural African communities. Through our activities in the field we have uncovered numerous possibilities for future research – underlining the fact that our research simply constitutes first steps towards a rural African interpretation of digital storytelling.

7.4.1 *Longitudinal studies*

An effective continuation of our design dialogue could take the form of a longitudinal deployment of our system. In our research we have developed a method to introduce mobile digital storytelling to a community. Such a deployment could study how communities and individuals appropriate mobile digital storytelling and develop a holistic understanding of the context and practices in which digital storytelling is situated. We have started to implement sharing and collaboration features. A longitudinal study could then also focus on how stories are shared in a community and how people collaborate synchronously and asynchronously.

7.4.2 *An ecology of digital storytelling*

In our design research, we focused on the story creation aspect of digital storytelling. But our activities in Adiedo and Mossel Bay reveal design and research opportunities with regard to locative and collaborative storytelling and digital story storage and retrieval. We have discussed these in detail in section 5.4.3. We also urge researchers not to discount the simple and natural forms of collaboration and sharing enabled by the small size of mobile phones. Our system often only played a minor role as collaborative digital storytelling activities unfolded. During these activities people communicated and collaborated in a natural way. We worry that this benefit of the real world might not translate into the digital world. In general, when designing technology for rural African communities, it is all too easy to be lured by technology and to forget that these spaces are inhabited by people; they function not as sites for technologies' in(ter)vention, but as homes and sites where people dwell and attend to interpersonal relationships.[4]

4. Bell & Kaye (2002) put forth a similar account applied to the design of domestic technologies.

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I know the meaning of plagiarism and declare that all of the work in this thesis, save for that which is properly acknowledged, is my own.