

# MOSES: Exploring New Ground in Media and Post-Conflict Reconciliation

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## ABSTRACT

While the history of traditional media in post-conflict peace building efforts is rich and well studied, the potential for interactive new media technologies in this area has gone unexplored. In cooperation with the Truth and Reconciliation Commission of Liberia, we have constructed a novel interactive kiosk system, called MOSES, for use in that country's post-conflict reconciliation effort. The system allows the sharing of video messages between Liberians throughout the country, despite the presence of little or no communications infrastructure. In this paper, we describe the MOSES system, including several innovative design elements. We also present a novel design methodology we employed to manage the various distances between our design team and the intended user group in Liberia. Finally, we report on a qualitative study of the system with 27 participants from throughout Liberia. The study found that participants saw MOSES as giving them a voice and connecting them to other Liberians throughout the country; that the system was broadly usable by low-literate, novice users without human assistance; that the embodied conversational agent used in our design shows considerable promise; that users generally ascribed foreign involvement to the system; and that the system encouraged heavily group-oriented usage.

## Author Keywords

Liberia, new media, post-conflict reconciliation, conversational agent, user generated content

## ACM Classification Keywords

H.5.2. [Information Interfaces and Presentation]: User Interfaces – User-centered design, ; K.4.m [Computers and society]: Miscellaneous.

## General Terms

Performance

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## INTRODUCTION

*"I had an experience in Monrovia—I came across a computer in a box, where people discussed issues with one another and the box computer were carried to other counties and people were discussing things, so when it comes here, so when it comes to River Cess you shouldn't look at it at something strange, this is what you should do you should just follow the instruction, that is very clear you will be able to use it."*

In this quote, a resident of River Cess County, Liberia described his experience using MOSES—the Mobile Story Exchange System—an interactive video-sharing kiosk that has travelled through much of Liberia since May 2008. He is one of nearly a thousand Liberians who have expressed their stories and opinions using the system.

Five years earlier, Liberia's ruinous 14-year civil war ended, and the long, difficult process of post-conflict reconciliation and reconstruction began. We have designed, built, and deployed MOSES in order to explore the role that interactive new media technology can play in that process.

Past experience suggests that this role could be significant. Traditional media such as television, radio, and print, often feature prominently in post-conflict reconciliation and transitional justice [16]. But new and interactive media forms have largely been ignored in this arena, we suggest, to its detriment. Digital media, such as the system described in this paper, enable a new level of interactivity not possible with broadcast technologies. As the explosive popularity of 'user-generated content' in recent years has shown, new media offer the opportunity for anyone to tell their story and to have an audience. What better breed of technology to support the deeply personal and communal process of post-conflict reconciliation?

For the past several years, we have collaborated with the Truth and Reconciliation Commission (TRC) of Liberia—an official body established to investigate the history, causes, and effects of the war, to recommend alleged perpetrators for formal criminal proceedings, and to promote peace and national healing. Our mission has been to explore new media forms in supporting the commission's important work.

MOSES is one result of that collaboration. It is a mobile interactive computer system that allows users to browse and

watch video messages, and to record their own messages for others to see. Through an innovative design process, MOSES was shaped to meet the unique and challenging constraints presented by the Liberian environment, including no guarantee of print or computer literacy, scarce electricity, absent Internet connectivity, dusty or wet terrain, and uncertain physical security.

This paper offers several contributions. First, we describe MOSES in detail, including several design innovations. Our findings indicate that the design has achieved our goal of walk-up usability despite its novice audience and environmental constraints. Second, we describe the novel design approach we developed. That approach incorporates the Liberian diaspora in the U.S. in order to help manage the distances, physical and cultural, between our design team and the intended user group in Liberia. Finally, we report on a qualitative, interview-based study in which we sought the impressions and perceptions of users of this unique system. We find that MOSES engendered feelings of empathy and reciprocity in our participants, and we observed that rather than focus on the past civil war, most participants chose to talk about pressing issues of the present and hopes for the future in their videos.

We believe that this work opens a new area of inquiry, namely interactive technology design for post-conflict reconciliation. Our findings carry important implications for future work in this space.

## BACKGROUND

### Liberia

Politically established in 1847 by freed African slaves from the USA, Liberia is situated on the Atlantic coast of West Africa. English is the official language, and while only about 20% of Liberians speak Standard Liberian English, a majority of Liberians understand other pidgin English variations.

Unrest has been a staple in Liberia for more than 14 years with two major civil wars in this time period. These years of conflict have seen nearly one-third of the population displaced and taken the lives of approximately 250,000 people. A tenuous peace was established in 2003 and democratic elections were held in the fall of 2005.

Protracted conflict has taken its toll on Liberia's technical infrastructure. Electrical power comes mainly from diesel generators, making it scarce and expensive. All fixed telephone lines were destroyed in the conflict, although a thriving mobile telephone system has grown up in recent years. Internet penetration levels are among the lowest in the world.

Like many other post-conflict nations before it, Liberia has established a Truth and Reconciliation Commission (TRC) in an effort to bring about national healing through the establishment of a factual record of the events and effects of the conflict. While more comprehensive information on

TRCs can be found elsewhere [12], one of the pivotal roles of any such body is the wide dissemination of its findings and the stimulation of public dialogue and debate, such that the truths it establishes become common knowledge. The Liberian TRC's mandate states as much when it stresses "... that introspection, national healing and reconciliation will be greatly enhanced by a process which seeks to establish the truth through a public dialogue...." Both our research group and the leadership of the TRC have recognized the potential of ICTs to work in service of such goals.

### Media and Post-Conflict Reconciliation

The importance of information and communication technologies to peace building and reconciliation has long been recognized. Scholars, practitioners and international bodies alike have all examined the role of media in the post-conflict environment, and a myriad of studies and reports have been authored on the topic (e.g. Price [25] Howard [15], Marie-Soleil [20], and Hieber [13]). This body of work, however, has focused almost exclusively on traditional forms of mass media. A minority of work has explored Internet enabled media components, and even less has looked at interactive citizen media in post-conflict settings. Examples of traditional media projects include the activities of the group Search For Common Ground, which promotes conflict resolution through radio and TV content it produces in former conflict zones [22]; and the Videoleters [1] documentary project, which facilitated the exchange of video messages between people affected by the Balkan war and aired a compilation of the messages on national TV stations in the region.

All of the activities mentioned so far are based on traditional broadcast mass media (TV, radio, print, etc.) and professional or trained content producers. It is natural that this is the common approach since these channels remain the most pervasive source of information in most of the world, and especially in many developing countries where Internet penetration is still low. Nonetheless, a modest number of initiatives have begun to explore the potential of the Internet and interactive media in post-conflict peace building. For example, the Gurtong Peace Project provides an online platform for information and discussion on peace issues in South Sudan [2].

The obvious trouble with the Internet as a platform is the extremely low Internet penetration found in many post-conflict areas, Liberia included [6]. Our work seeks to overcome this barrier and extend the opportunities of interactive new media into the immediate post-conflict environment.

### HCI and International Development

In recent years a growing body of research has emerged around the challenge of designing interactive systems for users in developing countries. Such environments present unique challenges for interface design, such as low literacy

rates, harsh physical environments, unfamiliarity with technology, and cost constraints. Ho, *et al.*, have recently offered a broad survey of the origins and accomplishments of this emerging field [14].

Perhaps most relevant to our work are several projects that have explored user generated content in developing regions. Sterling's AIR (Advancement through Interactive Radio) project put custom-made devices in the hands of rural Kenyan women, enabling them to contribute audio content to local community radio shows at no cost [28]. Meanwhile, in rural India, the Storybank project created an experimental environment, consisting of a communal computer display and a set of specially configured mobile phones, which supports the creation and sharing of narrated slideshows [11]. Agarwal, *et al.*, created a similar system, also in rural India, but based on the pre-existing mobile phone infrastructure. That system allows callers to create and browse content in the form of audio clips delivered over the phone [4]. Each of these systems is still in its early stages, though each reports a general enthusiasm among its users toward the act of producing their own media content. Each paper also reports lessons learned regarding design for rural, low-income users.

A considerable body of work has explored interface design for illiterate or semi-literate users [8,21,27]. Systems designed for access by the general public present an additional design hurdle: the requirement for usability with no prior system training, sometimes referred to as 'immediate' usability [18]. This requirement is especially challenging where general familiarity with computers is low. Several previous systems have been designed with general access in mind [4,24,27], but all of them were audio-based. Our work is the first, to our knowledge, to achieve immediate usability in a GUI system for this kind of user community.

### THE MOSES SYSTEM

MOSES is an interactive computer system which allows users to browse, watch, create, and share video messages. The system studied here is housed in a self-contained and ruggedized kiosk, allowing it to be deployed autonomously in public places. Users can browse the system's collection of videos recorded by previous users, and they can record their own videos, to be stored and viewed by subsequent users. The kiosk is designed to be mobile, and can be easily disassembled and transported in a vehicle.

### Design Process

MOSES was designed through an iterative, participatory process involving HCI experts, members of the Liberian diaspora<sup>1</sup> in Atlanta, and Liberians living in-country. Our HDF (Heuristic → Diaspora → Field) iterative design

<sup>1</sup> Diaspora here refers to the community of Liberians living outside their homeland.



**Figure 1. The MOSES kiosk (left) includes a 19" display behind rugged clear plastic, a webcam, a shielded directional microphone, amplified speakers, and mobile power supply (not shown). 'Moses', the system's conversational agent, is pictured on the screen. The red cursor buttons and the "yes" (white) and "no" (blue) buttons are visible to the screen's right. Large groups of users often form around the system (right).**

method is an attempt to respond to the realities of designing for a population of users that are physically and culturally distant to the engineering team. The process calls for candidate designs to be reviewed first by in-house experts, as per the well known heuristic evaluation technique [23]. Following that, design concepts are tested with informants from the local diaspora community, and further refinements made based on those tests. Only then are designs transported to the field for the most robust and rigorous series of tests and design exercises. More details on our design process can be found in an earlier case study [7]. We review some highlights here.

In total, 11 meetings were held with our diaspora informants. Initial user studies involved paper prototypes and think-aloud exercises, and were useful in persuading us to simplify the navigation structure of our early designs, and to pay careful attention to the design of audio voice prompts. Later tests were helpful in refining our choice of icons and symbols for a Liberian audience.

Of note, several of our exercises with the diaspora were not successful. Recording of the system's voice prompts was first performed by a Liberian expatriate, but his Americanized accent was deemed foreign by users in Liberia, and the recordings had to be re-done. An instructional video we produced with diaspora members was poorly received for similar reasons. The overarching lesson appears to be that some system design principles and guidelines can be gleaned through diaspora interaction, but system content is more sensitive to minute cultural differences and is best produced in-country.

Many further design revisions to both hardware and software also came through observations and feedback during field tests; even our extensive work with Liberians in the diaspora was not sufficient to capture the full in-

country contextual realities. For example, early deployments revealed that the system tends to be used by transient groups of people rather than a single focused user. This had serious ramifications for the design of the system's instructional facilities. Meanwhile, higher than expected noise and ambient light levels necessitated modifications to the system hardware and housing.

### Physical Makeup

The most recent version of the kiosk is shown in Figure 1. It consists of a heavy wooden enclosure, a 19 inch video display, video camera, shielded shotgun microphone, amplified speakers, seven ruggedized input buttons, several ventilation fans, detachable sun shade, and power source. Power is provided by two 80 amp deep cycle batteries and an AC inverter. The system can run uninterrupted for 8 hours when fully charged. The white enclosure is separable into two parts for stowage and transport. The lower compartment contains the batteries and inverter which power the unit. The upper compartment houses the laptop, display, and interface controls, as well as the unit's speakers and amplifier. Both compartments can be locked, and the clear plastic panel that protects the display is made of rugged plastic. These features make the system reasonably secure, such that it can be left unattended for short periods.

### Interface Design

The system's interface is a simple wizard design featuring an embodied conversational agent. Its visual appearance is shown in Figure 2. The user is guided through the system step-by-step using audio instructions. In order to cater to illiterate users, no text appears on the screen at any time. The system first introduces itself, and then offers to play a video. The user is then asked to choose a category from a set of illustrated icons.

The categorization feature was added midway through the design process, after a significant number of videos had been collected. The categories (business, education, government, jokes, music, TRC general, TRC hearings, and war stories) were thus inspired by existing content. Icons representing the categories appear in a random order on the screen. The category icons were drawn by a Liberian artist.

Users can then choose a particular video from a set of up to 10. The 10 videos shown are selected based on a combination of popularity and newness. Videos are organized only based on category and date. A previous version of the system included support for users to record responses to videos, but that feature was not frequently used, and was later removed.

Each video is represented by a dynamic thumbnail, which continuously cycles through 5 frames taken from the video. The user selects among these videos by moving a cursor using the kiosk's four red directional buttons which are situated at cardinal positions. All other input is in the form



**Figure 2.** Four images of the MOSES user interface. ‘Moses’, the system’s animated conversational agent (top-left) guides users through the interface. Videos are browsed by category (top-right). Users select videos to watch from dynamic thumbnails (bottom-left). When the user is recording or watching a video, it occupies the full screen (bottom-right).

of a yes/no question. ‘Yes’ and ‘No’ are mapped to the white and blue buttons, respectively.

Once the user has selected and watched a video, the system offers the opportunity to record a new video. If the user accepts, they are guided through the recording procedure, which includes some instructions on proper delivery, adjusting the camera, recording, reviewing what was recorded, choosing whether to save or delete the recording, and finally choosing a category for the video. Once the recording process is complete, the process starts again, and the user is allowed to select another video to watch.

The system also delivers periodic greetings in addition to the original introduction. Users of the system tend to come and go, so greetings give basic information about the system's purpose and function.

The audio instructions, greetings, and prompts are delivered by an animated agent named Moses (a common male name in Liberia), shown in Figure 2. Moses sometimes occupies the full screen, and sometimes shrinks to the corner or center of the screen when a cursor selection is to be made. Moses disappears entirely when a video is playing or a recording is underway.

An animated agent was chosen to appeal to users unfamiliar with computers, as well as to give the system something of a personality. The agent's voice is pre-recorded in the local dialect (Liberian English) by a voice model. The agent's image is a cartoon-style animation which we created using Oddcast's Vhost Studio software [3]. The software synchronizes the character's mouth movements with the pre-recorded voice, and adds lifelike features, such as slight head movements and eye blinks. Moses also follows the on-screen cursor with his gaze, making the integration of Moses into the GUI more convincing.

The instructional system was designed according to the principle of *rehearsal* [19]. Novice users are helped along with instructions, but as they get more practice, they can make selections before the instructions complete, thus moving through the system more quickly. Instructions and prompts provide help in an incremental fashion, with inaction by the user as a signal that more help may be needed.

### Trust and Risk

Given the often sensitive nature of post-conflict discourse, MOSES inevitably raises questions of trust and risk. MOSES is intended a public, non-confidential system, and every effort is made to communicate this to users.

Public discourse features strongly in Liberian culture. For example, the Liberian palava hut is a ubiquitous village gathering place, and serves as a cultural symbol representing community discussion and deliberation. In many ways, MOSES is presented as a sort of digital palava hut, such that users can transfer their existing models of trust and risk to it.

### MOSES IN THE FIELD

Design work on MOSES began in fall 2007, and a prototype system was deployed to Liberia in May 2008. The system has travelled extensively through much of Liberia since then, with the design continually evolving through several iterations until spring 2009, when development was halted. The study reported below took place subsequent to that, in the summer of 2009. Since its initial deployment, thousands of Liberians have interacted with MOSES and over 900 videos have been recorded and saved.

A review of video categories reveals that recordings span a surprising range of topics. Primary development issues like government (16% of recordings), education (12%), the TRC process (12%), women's issues (5%), and business (3%) received much attention. Lighter genres such as jokes (19%) and songs (19%) were also quite popular, although many of these still dealt with weighty themes. Only 15% of videos were saved in the war story category. This general result was echoed in the study reported here, and is discussed later.

### EVALUATION METHODS

This paper reports a qualitative examination of the effects and impact of MOSES. We adopted a qualitative, exploratory approach due to the sheer novelty of the technology for our Liberian users and the lack of previous work in this area. This approach is common in studies of technology in unfamiliar settings (e.g. [5,31]).

Our report draws on three sources of data. The principal source is an interview-based study of first-time users of MOSES. Additionally we draw on a content analysis of the videos recorded by MOSES users. While the scope of this

paper does not permit a deep analysis of that corpus, a summary of dominant themes was presented in the previous section. Finally, our conclusions depend on researcher observations made of system use. These were recorded in the field and incorporated in our analysis.

For the user interviews, participants were first asked a set of 15 closed-ended questions about their technology use habits, such as computer experience, and about their use of MOSES, such as how many videos they recorded. The remainder of the interview consisted of approximately 20 open-ended questions about their experience with the system. Interviews typically lasted about 40 minutes. Participants were not offered compensation.

The study was carried out at multiple locations during the summer of 2009, with typically 3-4 participants sought from each site. A site visit consisted of approaching the community, seeking permission of local authorities, setting up the system, allowing a crowd to gather (as one inevitably did), and intercepting people as they finished using the system soliciting their participation. Only people who had used the system for a non-trivial period of time were recruited. This study, therefore, examines participant's meaningful use of the system and does not consider the perspectives of those who declined to use the system. We visited 15 sites in total, spanning 5 different counties in Liberia. Furthermore, 6 interviews were carried out in Monrovia, Liberia's capital city, and 6 more in the surrounding metropolitan area. Sites were chosen based on several criteria, including a high chance of people walking by, availability of shade, and low noise levels. No sites were visited more than once.

The only condition for selection of subjects was their having used the system for a non-trivial period of time and being of majority age (18 or older). Participants learned how to use the system with the help of Moses or the surrounding group. To avoid influencing their experience, no interaction occurred between the participant and experimenters until *after* the participant had finished using the system. While the mere presence of the experimenters nearby may have been noticed, we believe that the novelty of the MOSES technology and the presence of the group that often formed around the kiosk were more immediate, negating any such experimenter effects.

Participants in the interview study were mostly men (26 of 27), which unfortunately reflect the bias of users of the system. The average age was 29 years, and the average level of education was 10<sup>th</sup> grade.

Due to the novelty of this research, we avoided a hypothesis-oriented approach to analysis, and instead distilled themes of interest via inductive reasoning. This strategy is characteristic of several well-known techniques for qualitative analysis [29]. Interesting excerpts of interviews and field notes were initially read and coded independently by three researchers in an open coding

exercise. Codes were then examined collaboratively to distill overarching themes.

## RESULTS

In this section, we describe the themes we uncovered in our analysis of interview data. Themes could be said to span both the medium and the message: participants commented extensively on the details of the technological artifact, as well as the broader context and meaning of their experience. We begin by reviewing what participants seemed to identify as the chief function of the system.

### Empathy and Reconstruction

The communicative potential of MOSES was widely recognized by our participants. Firstly, there was wide understanding that the kiosk was mobile, would travel to other parts of Liberia, and would carry their messages with it:

I was not expecting Moses here today, and Moses came here, so I think that he will go other places.

This understanding was accompanied by enthusiasm about the opportunity to express one's view and for there to be reciprocity as other's follow-on with their own videos:

Why will I come? Because at least my view can be heard out there, [and] others can be able to express themselves too.

Moreover, many participants expected a warm empathetic audience once their message arrived. For instance, one participant expected others to support his complaint about the cement trade:

Well the video I just from recorded I expect for more Liberian to see it and know the reason what I said about the cement. ... And more especially the distributor of Cement Co., how they delay and do the cement business.

Another complained about excessive fees in a government school, again expecting agreement:

The government school that they have here ... they say we must pay a closing fee, 20 dollars for each person. I has a four children sending to the school. ... So I don't call it 'government' school. That why other people, them will witness me, they will say point that it so true that the boy saying<sup>2</sup>.

The expectation of an audience seemed to arise from a notion of reciprocity—since our participants had watched other people's recordings, so too would other people watch theirs:

I saw another people [in the system] from another county like Bong county, the Bong County they are

<sup>2</sup> This last sentence can be understood as saying: That is why other people will agree with what I say; they will say it is so true what I am saying.

there. So when you enter in Zwedru when you go in Sinoe county I know people will be there to watch me too, so it will go far off.

Several participants foresaw future audiences deriving comfort from seeing that their experiences are not unique. For example:

[My video] will go places and people will witness it, and they will know what happening in some area. For them to know what happening they will get to know it is not happening in one place, it happening all over.

While these perceptions of the system met our expectations, we were surprised by the *infrequency* with which participants spoke about the war in their recordings—only 2 out of 27. Instead, people seemed to prefer to talk about development and the issues of the day, including child labor, the price of building supplies and gasoline, demolition of low-income housing, the truth and reconciliation process, the rights of disabled people, HIV/AIDS, literacy, patriotism, roads, and government.

Reasons for this aversion to war talk could be emotional for some:

About the war you know, it brought back old memory, old wounds. Because what I went through during the war was too bitter. So I didn't want to see those things but when I saw it my mind went back to the war.

However, another participant seemed to better capture the predominant mood we encountered:

Yes it very interesting, is good for other people to share their experience about the war whatever, since TRC is here ... But I think we will be glad to be engaging in sensitization programs on HIV awareness, clean-up campaigns, you know, malaria, other sensitization programs, than just war experience, because we already done with the war; it's behind us already.

This view that the war was in the past and matters of the present and future were more important was expressed by many participants, and MOSES seemed to represent a vehicle to carry discourse and build unity around those important issues.

### Usability and Personality

Even without the active intervention by project staff, nearly all users were able to use the basic functions of the system, including selecting categories and videos, and making recordings.

The usability of the system came up often during our interviews. For instance, when asked how they would describe the system to others, many participants focused on usability:

I will say something like is a nice system—you don't have to be afraid of it or shy away because no



one is going to eat you there, you are not going to read too much something there, but it will teach everything. That is very easy. You can do your own program within just two minute time.

Several participants expressed a sense of triumph or pride in having successfully used the system:

... this system is easy to use. For me I love using it. Make me lively when I using it.... You have somebody speaking to you, that you are operating. It is very easy to operate.

This was despite initial trepidation on the part of some participants, who were afraid to use the system at first, but eventually picked it up:

My first seeing it, I thought it was hard, but that mean it too life<sup>3</sup> when I go use it—I feel fine.

It appeared that much of this positive response was due to Moses himself, the animated agent, and the positive response to Moses was one of the strongest of our findings. Several participants mentioned him by name before we mentioned his name ourselves.

A: It was very very easy because everything he will tell what to do so it was very easy to me.

Q: Who will tell you what to do?

A: Moses.

Beyond simple recognition, most participants closely identified him, and the instructions he gave, with their successful user experience:

The man from the instruction, he say 'If no press the blue button if yes press the white button.' If you wanted stroll down and you get to another picture to see, then you press the red button. So it make it easy.

Throughout the interviews, Moses was strongly anthropomorphized. People gave him human qualities, calling him 'helpful', 'educative', 'jovial':

He's my friend. Anybody help you is your friend.

Several participants also attributed ease of use to Moses' Liberian English skills.

He is very eloquent for our setting, eloquent in the sense that he's not speaking that standard<sup>4</sup>, but we can relate to him, anybody for that matter, anybody for the low class... you can be able to understand him.

Here again, the anthropomorphization is evident. However, it would be premature to attribute the usability of the system entirely to the presence of an embodied agent. We discuss this further in the future work section of this paper.

<sup>3</sup> 'Life', used as an adjective, is Liberian English for enjoyable. The modifier 'too' should be read as 'very'.

<sup>4</sup> 'Standard' refers to standard English, as opposed to Liberian English.

Nonetheless, the finding that the system was generally usable remains significant, as does the affection users expressed towards Moses the animated agent.

### Groups and Privacy

The usability of the system was not, however, entirely due to the technology itself. It was evident that a large part of most users' experience with the system was their interactions with the group that usually surrounded the machine. The size of this group was often formidable, as can be seen in Figure 1. We estimate that approximately half of the participants we interviewed learned to use MOSES on their own, using only Moses' instructions, while the other half learned with the help of the group.

The typical scenario was as follows: an initial group forms around the machine with everyone somewhat reluctant to touch it. Moses continues to solicit interaction until finally someone is brave enough and steps forward, following Moses' instructions, while others watch. When the initial pioneer is finished, others are encouraged by what they have seen and learnt in watching the pioneer. Knowledge is carried forward through the group in this fashion with the dynamic and rolling arrival and departure of people.

This group dynamic engendered a sense of pride in one participant:

I feel very pride, most specially student was there and market yana [sellers] people was there, they were all around me because they themselves they want to be educated. They were also a helper to me.

Another recognized the diversity and social leveling function of the system:

Because at least other people, people who are not learn [educated], when they look at you they will say ok and say what the man [Moses] touching they too will be encourage and have that momentum to do the same as you are doing.

Many participants reported that social interactions were also usually responsible for their being drawn to the machine in the first place. One teacher approached the machine after he saw one of his students using it. Here too we get a sense of the social leveling offered by the system:

Some time a student can be a teacher and even a teacher some time become a student, and I saw my student using the computer. Once my student can use it, I know that I can use it.

As the predominance of this group-based usage style became evident, we were concerned about whether the presence of the group was affecting what people talked about. We asked participants a specific question about this during interviews—whether, if given the chance to speak in private, they would say something different. Few said they would. One participant even claimed he felt more secure in the group setting:

Really I [wouldn't] feel comfortable because it is in a area that is confined and I alone there, but while people around me and other thing I feel comfortable to express my view.

The one perceived advantage of privacy was the reduction in noise and disruptions. While this is a valid practical concern, it seems minor in comparison to some of the stronger concerns around privacy and technology that one might expect in Western contexts. Thus the picture that has emerged is one of considerable comfort with group usage of this expressive technology.

### Foreign Involvement

A common (and accurate) assumption among our participants was that MOSES was a product of the foreign donors and organizations operating in Liberia. One participant assumed our staff worked for the largest foreign presence in Liberia, the United Nations:

I believe you people work for UN, that my belief. ... Because I know [Liberian] government cannot do that [build MOSES].

Others thought we worked for foreign NGOs. This assumption of foreign involvement is by no means surprising in a country with such a considerable donor presence. This fact was also acknowledged:

Government carrying on reconstruction publicly where you can see people from different, different area coming in. We have Chinese, we have the American, we have the Dutch, we have the Norwegian, all lot of people in this country carry on total development.

We also observed considerable sophistication on the part of many of our participants in discussions around this topic. One participant invoked a Liberian parable which advises not to teach a person how to eat rice when there is no rice to eat, the message being that we should not allow people to learn to use MOSES just for this single time unless we plan to return with the system:

As long you'll be on this side your mo na [shouldn't] teach us how to eat the dry rice. Then the next time you come, we cannot see the dry rice again. So your mo [must] keep on be coming on this side for us to be used to it too.

Beyond sustainability, participants also expressed concerns about scalability:

You are here now, maybe you cannot be here—you be in Lofa, you be in Cape Mount, you be in [other Liberian county]. What are your desire to get 2 or 3 or 4, to get more machines? ... What mechanism you put in place for you to do such a thing?

and funding:

I will say the system is very much important, and I believed those that invented this system, I ask the

government to give them more support, that will enable them make more than thousand of it.

All these observations, from the simple assumption of foreign involvement to the nuanced perspectives about future plans, point to the highly prominent role that foreign donor institutions play in Liberian society, and the awareness that reality engenders in the country's citizens.

## DISCUSSION

### New Media and Post-Conflict Reconciliation

Of course it is too soon since the end of Liberia's civil conflict to judge the true impact of any initiative on securing a lasting peace. It would also be unrealistic to expect an experimental project on the modest scale of MOSES to have a measureable impact on a nation of over three million. However, we feel that this study has provided some promising outcomes that justify further exploration.

We found that MOSES could indeed support an engaging and meaningful dialog. While MOSES cannot support direct conversation, we found that users were able to experience the viewpoints of other Liberians from various counties, and many were also eager to share their own opinion, on the expectation that these too would later be heard by others. We also observed that for many users, simply having the chance to record a video and see it played back then and there was an edifying and exhilarating experience.

While some past work using traditional media (e.g. [1]) has supported a modest level of interactivity and citizen participation, we argue that nothing in the post-conflict media space comes close to MOSES in this respect. We feel that our approach, in which large numbers of everyday citizens are empowered to tell their own story and to explore the perspectives of others, thus represents an exciting departure from previous work. Our findings suggest this approach shows promise.

One of our more surprising results was the subject matter that MOSES users chose to address in their recordings. The initial vision for this project envisioned MOSES as a venue for stories about the civil war. This vision followed on the model of the archetypal TRC hearing, in which victims and perpetrators are given a platform to tell their war stories, in the interests of both truth seeking and reconciliation [12]. However, presented with the openness of the MOSES platform, users overwhelmingly chose to look past the war in their discussions, focusing instead on present-day issues of social, political, and economic development. Such a forward positioned dialogue, rather than a war focus, may be a stronger psychological tool for reconciliation [26].

Another predominant finding of this study was the assumption of foreign involvement in the creation of MOSES. Participants demonstrated their striking familiarity with the common pitfalls of donor-funded development projects by raising concerns about sustainability, scalability,



and funding. The association of our project with those realities seemed due to the sophistication of the technology against a backdrop of such scarcity. It therefore seems likely that future interventionist technology projects in Liberia and other post-conflict regions will encounter similar perceptions.

### Design and Usability in a Post-Conflict Nation

Our study showed that MOSES supported immediate usability for users without computer and print literacy. However, this paper has not examined the usability of MOSES in detail, nor can it comment conclusively on which aspects of the system design were most responsible for its success. Nonetheless, we are particularly intrigued by the prospects of embodied conversational agents in this context. Our users displayed a deep affinity for our agent Moses, strongly anthropomorphizing him, calling him a friend, and deriving pleasure and pride from successfully following his instructions. For people with no previous computer experience, we felt that this level of affinity toward a computer element was striking.

This finding seems to contradict realities in contemporary interface design. While the concept of embodied agents was first met with enthusiasm and considerable research effort (see for example [9,10]), agents are rarely incorporated in modern day user interfaces or Web sites. We hypothesize that the success of our agent may be partly due to its relative simplicity, which does not attempt to achieve sophisticated artificial intelligence. Instead, our agent is limited to simple heuristics and basic interactions. Our interest lies more in the potential of conversational agents, as highlighted in this study, to appeal to inexperienced users for whom the experience of computing might otherwise appear completely foreign or unappealing. However, we note that our enthusiasm results only from preliminary findings based on qualitative impressions. We plan to investigate this potential further and more rigorously.

Our other chief finding as concerns usability was the strongly group-oriented usage patterns that emerged. We assumed that the undivided attention of one user would be given to the system for the duration of a session. We thus placed greetings and instructional content near the start of the session. However, when large groups formed around the kiosk, users tended to come and go, violating the sequential model. Instead, knowledge offered at the session start was passed throughout the members of the group and thus preserved. We altered the design in subsequent iterations to adopt a different model which assumes a transient, dynamic group standing in front of the machine.

We feel that the finding of group-oriented usage was not only due to the novelty of the technology. We hypothesize that the communal nature of Liberian society also may play a role. Nonetheless, many questions remain. For instance, would the same style of usage transfer to other types of systems? Would it persist if the system were permanently

installed? What kinds of individual roles are established within a typical group? Generally, how can this tendency be exploited in the service of usability?

Previous work on shared or group technology usage is plentiful, but usually focuses on experienced users, school children, or office environments. Our interest lies in the effects of group usage for adult users with little or no computer experience in more communal environments like Liberia, where computer usage may be group oriented.

### LOOKING FORWARD

This paper has made contributions to two young areas of research: new media in post-conflict reconciliation and HCI for international development. We have found that interactive new media technology shows considerable promise for post-conflict reconciliation efforts and deserves further study. We have also demonstrated a novel system design which has made this first finding possible despite a highly constrained environment. In our future work, we intend to help define the former research area, and to make further and significant contributions to the latter.

Our efforts with the MOSES project continue as of this writing including further analysis of the data gathered to date and an ambition to expand the scale of the project to reach many more Liberians. Additionally, we are embarking on a new memorialization initiative. That project will explore contributions of new media technology to war memorials, either virtual or physically constructed in Liberia. Beyond Liberia, we are exploring opportunities for post-conflict computing initiatives in other regions, including Afghanistan, Sierra Leone, and Uganda.

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