

Building an Open Source, Mobile Optimized, Crowd-Source Translation Tool for Literacy Engagement in Rural Kenya

Evviva Weinraub Lajoie

Emerging Technologies & Services, Oregon State University, Corvallis, USA

evviva.weinraub@oregonstate.edu



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Abstract:

OSU Libraries and Press has been investigating alternative publishing paradigms, primarily using mobile technologies to explore how users can access and manipulate information. Maria's Libraries, an NGO in rural Kenya, in conjunction with Kenya National Library Services, has been testing innovative approaches and leapfrogging technologies through a network of libraries for the social, political, and economic development of communities in resource-poor settings. Together, these two organizations have been creating a mobile optimized platform using open source tools which will provide users the ability to crowd source translations of folk tales and existing children's books into a variety of African languages, sub-languages, and dialects. The goals of the tool are to provide opportunities for users to explore and play with new technologies, to provide a tool to improve early childhood literacy and to provide opportunities for cost-effective, multi-language publishing.

Keywords: Technology, Open-Source Development, Literacy, Publishing, and Partnerships.

1 INTRODUCTION

For over ten years, Oregon State University Libraries and Press (OSULP) have been staunch supporters and strong users of open source tools. We have launched a number of programs using open source technologies like MarcEdit, Library Find, and Library à la Carte. In early 2009, OSULP began its foray into mobile development as one of the first libraries with a mobile site optimized for both smartphones and feature phones.

When the decision was made to launch a mobile site the library planned to focus on development of innovative web applications in order to push out some part of its digital collections to users in the mobile environment¹; as part of that effort in 2010, a mobile walking tour, BeaverTracks, was unveiled. The tour, inspired by North Carolina State University's WolfWalk, connected the past to the present by geotagging historic images from the OSU Archives to twenty-two campus locations². In early 2011 Book Genie was released, a mobile tool designed to help users explore the library's leisure reading collection. Most recently, in 2012, we embarked on our first exploration of the future of the book in

collaboration with OSU Press, a department within OSULP, with the launch of Bart King's Architectural Guidebook to Portland.

From the beginning OSULP has focused on mobile web site development, avoiding stand-alone apps, which would tie us to developing for a specific platform or device. We felt optimizing for mobile was a better solution for us institutionally because it promised fewer issues with users having incompatible devices. This decision has caused some complications when working on new projects, but promises optimal openness and availability of what we create.

1.1 Introduction to Maria's Libraries

Maria's Libraries is a Non-Governmental Organization, NGO, based in New York and working in rural Kenya who, in conjunction with Kenya National Library Services, has been testing innovative approaches and leapfrogging technologies through a network of libraries for the social, political, and economic development of communities in resource-poor settings. Maria's Libraries main work involves building a modern, fully equipped library in Busia, Kenya. They also work to network libraries, running innovative programs through a pilot network of five libraries located throughout Kenya and they work to bring together local level information needs and innovative practices from around the world to develop cutting edge information services through libraries and promote local philanthropy.³

1.2 Partnership Beginnings

The author gave a presentation at the 2012 American Libraries Association (ALA) Annual meeting in Anaheim, CA where she presented on the latest exploration of alternative publishing paradigms using mobile technologies that OSULP had released. After the conclusion of the presentation one of the co-director's for Maria's Library approached the author with a partnership idea. Her idea was intriguing: use the OSULP expertise in mobile technologies and publishing with Maria's Library's user base to create a mobile website platform designed to provide users the ability to crowd source translations of folk tales and existing children's books into a variety of languages and dialects.

2 WHAT ARE WE LOOKING TO ACCOMPLISH

There is significant linguistic drift found between neighbouring villages throughout sub-Saharan Africa. This isolation creates situations where villages that speak the same root language use vastly different words to describe the same item, making it extremely difficult and cost prohibitive to print texts in local languages.

While there are many storybooks written in Swahili and English, there are very few books written in local languages in Kenya. As a result, many children entering primary school are taught to read in a language they do not yet speak or understand. Literacy rates among primary school children in Kenya are abysmal and this program may provide a platform for early intervention by exposing children to literacy, reading and multiple languages in a way they can understand before attending school.

Similarly, many parents want to provide educational support to their children but they often have very little education themselves. Books intimidate them, their reading skills are rusty, and stories they recognize are not readily available in forms they understand. The tool we

have created seeks to equip parents with resources needed to support their children's education.

There have been repeated attempts to make publishing physical books in local languages feasible, but with over forty local languages in Kenya alone, there is no business model that provides a cost-effective solution. By moving to an electronic format, and creating a translation tool like this, we are hoping to build a cost-effective mechanism for local language publishing, both for the educational objectives outlined above and for cultural preservation.

2.1 Targeted User Groups and Goals⁴

2.1.1 Children

The benefits of early childhood education on life-long learning are well known to librarians and educators. Children who have had early exposure to books and reading are far more likely to succeed in school than children who have not.⁶ Rural Kenya finds this effect compounded by the fact that the language spoken at home is not represented in classroom teaching or in available storybooks. Children are therefore taught to read at an older age, and are often taught to read in a language they do not yet understand.

The target children are aged 2 – 5, though older school aged children with previous reading exposure will also benefit. They have not yet started school and have likely never seen a computer or book before. They speak either the local language or Kiswahili at home. There are likely no books in their local language; there may be some books in Swahili available to them, but they are not geared toward their age group. Their primary interaction with books will be through school. When they arrive at school, they will face differing language challenges. For example, in Busia, they will be taught in their local language and Swahili until the equivalent of third grade, when they abruptly switch to English. At the beginning of the third grade all of their courses will be taught in English. This abrupt shift and lack of preparation has significant life-long effects on literacy and educational outcomes.

Goals

- To encourage reading at an early age
- To promote a life long love of learning.
- To provide early exposure to languages of instruction alongside spoken languages,
- To promote a sense of comfort with books and reading,
- To create content for children that is relevant to and reflective of the community.
- To make children feel that the library is a resource for them
- To support a life-long bond with their parents
- To encourage familiarity with technology at an early age

2.1.2 Parents

Most of the parents in the target group may not feel confident in their reading. They do not know how to verify information, and lack grammar and vocabulary skills. They do not read books for enjoyment. In most cases, they have gone to primary school but not secondary school and their ability to read ranges from literate to illiteracy. Post-school reading for many parents is limited to the bible or the occasional newspaper. They have likely never

seen a book in their local language and have probably never seen a book that reflects their own culture. They believe strongly in education, but may not be able to send their children all the way through school. Parents want to influence their child's education, but do not know how. They have had little to no contact with other communities in Kenya and they have never used a computer.

Goals

- To teach parents how to explore story books with their children
- To encourage a bond between parent and child
- To provide engagement opportunities with books
- To increase the parent's computer skills
- To expose them to other cultures
- To provide a mechanism to preserve their own culture
- To give them a chance to engage with other communities through storytelling
- To provide them with literature in their local language
- To help them prepare their children for school
- To re-introduce them to reading in a way that is not intimidating
- To provide them voice as content creators
- To instil pride around their stories
- To provide familiarity with new technologies
- Parents will access books on tablets, computers, and eReaders
- Parents will access books on feature phones or smart phones

2.1.3 Librarians and Teachers

Because new technologies are slow to arrive to this area, librarians will need to be taught how to use tablets and how to access the books on them. The librarians will all have access to tablet computers or e-readers. Some of them will be trained librarians and some of them will be community volunteers. Teachers are unlikely to have had much experience with computers; they will go to the library to access digital books. Despite having limited access to newer technologies, they are likely to have feature or smart phones and have accessed basic educational programs on their mobile phones.

Goals

- Provide local language literature content
- Attract new users to the library
- Promote parent/child literacy
- Provide access to technology relevant to their lives
- Create teaching/learning opportunities for users
- Help users acquire and improve reading skills
- Help users improve computer skills
- Provide faculty with teaching tools
- Help faculty improve literacy standards of their students
- Expose faculty to different languages that are spoken in their community
- Provide them with content that is relevant to their students' lives.

2.1.4 Secondary User Groups

International Libraries, International Users, Urbanite Parents

International and urbanite users are primarily members of the Kenyan diaspora who are interested in purchasing and preserving stories from home in the languages of their homeland or are educated individuals living in major metropolitan areas in Africa. They are also academics performing research in regional languages and culture, or libraries with collection policies that match the titles and/or content. These users will be able and willing to purchase books. They will have access to the latest technologies and will be highly literate. They likely read for work and for entertainment. Urbanite parents may prefer watching entertainment to reading.

Goals

- Attract new users or donors to the library
- Promote preservation of cultural heritage
- Encourage research opportunities through availability
- Promote preservation of local language
- Ability to share stories and language of their homeland

Farmers and Other Adult Community Members

Farmers and other adult community members may use the books for information purposes. Because the technology is oriented to children and the text is relatively simplistic, it will make it more accessible to adults who may not feel confident in their reading, grammar, and vocabulary skills. This group as a demographic looks much like the parents group outlined above. Despite that, different communities of practice are likely to find the tools, if not the information contained, useful.

Local Publishers

Africa has struggled with creating a sustainable publishing model that supports the publishing in the multitude of languages spoken throughout the continent. This tool would tie into the work that the African Publishers Network⁵ does and could act as an exploration of a cost effective digital platform for delivering multi-language content with relatively low overhead costs.

3 OPEN SOURCE TOOLS FOR DEVELOPMENT

Based on our local success creating the companion mobile tool to Bart King's Architectural Guidebook to Portland and our conversations with our partner's at Maria's Libraries we were tasked with creating a mobile-optimized, crowd-sourced translation platform. This proof-of-concept would allow any user who created a user name and password the ability to translate pieces of text into their local dialect and to vote for which translations were best. Because of the core need for the tool to work for groups who spoke the same language, but slightly different dialects, we needed to be able to provide the ability to accept multiple sub-dialects within a single language, and a way to allow us to identify the most accurate translation of new dialectic versions.

The decision to build the tool optimized for use in a mobile platform was a primary goal from the beginning due to the target audience's preferences. Our partners at Maria's Libraries have provided tablet computers to their patrons in Busia. More broadly, there is ample evidence that indicates that, because of lack infrastructure, people are skipping over desktops and moving directly to mobile technologies.⁷ We have seen this kind of leap before in Eastern Europe when people jumped to using mobile phones over landlines while waiting for the infrastructure to be built.

3.1 How Was It Built?

We began by asking for a requirements document from our partners. They sent us a document that included everything they hoped the tool would do. These included a workflow to recommend new root languages and the addition of interactive and cultural content in audio, video, or image format. These items fell either well outside of our initial agreement for a proof-of-concept, were technically very difficult, or were items that should be handled as separate projects. We addressed this by returning to them a four-phased development plan with three different options for building the tool. We outlined the costs for hiring or paying for staff time at OSULP, paying for OSULP staff to train programmers in Kenya on agile programming techniques, the languages used, and how to maintain and expand upon the base tools we had built, and the basic costs for hiring an outside contractor to build the tools for them. The expectation was that beyond the initial proof-of-concept, which was provided for no charge by us, further development costs would come from soft-money sources.

The platform itself was built using Ruby on Rails, which was chosen for its wide availability of well-supported modules for user authentication, translation management, and easy implementation of automated testing. HTML5 was used for offline caching and content editing abilities. We used popular JavaScript frameworks for the client-side user interface. Wink Toolkit, a lightweight mobile framework was used for many of the interactive and mobile-friendly features.

Phase 1 had a delivery timeframe of two months. We agreed to provide a functioning wireframe as a proof-of-concept in order to show potential donors what the tool could do and where it could go with an influx of additional funding.

1. Registration/login system for translation features
2. Anonymous reading of any book.
3. Clean mobile UI with easy navigation
 - a. Allowing for intuitive switching between books and translations.
4. Crowd-sourced translation features
 - a. Each book will come with the ability for registered users to translate it to a set of languages pre-defined by administrators.
 - b. Users will translate a page at a time.
 - c. Both book and page modifications can be easily voted upon by logged in users.
5. Offline-enabled reading for books after obtaining them from a Wi-Fi Connection.

3.2 Technological Constraints

Agile programming works by breaking tasks into small pieces that do not directly involve long-term planning.⁸ Because the programming is done iteratively it provides for quick changes over a short period of time, allows for adaptations to the project to happen swiftly, and promotes regular updates to documentation. While prior to this project, we had used some agile programming techniques; most of our work had been done in a much more traditional, sequential manner. This was our first opportunity to test out working in a scrum and dedicating time for a number of sprints. This was also our first large-scale project with integration and unit testing frameworks in place from the beginning.

There were a few serious technical issues that we needed to find ways to deal with. Some of these were issues relating to the tasks the tool needed to perform, but some of them are around creating a tool that takes into account the available infrastructure of our users, most pointedly, the limited bandwidth available for uploading and downloading content. Because of this, the ability to use the site offline was requested. This would have required heavy caching on devices that currently do not have the necessary storage limits, not to mention the fact that it makes development of other pieces of the project more complicated. Only more recently released devices support this kind of caching, so as a result, offline capabilities were limited to book reading.

There are a number of features we would like to add. For example, creating an “Admin” section was not part of the Phase 1 implementation plan, which required us to use the command line to import new stories. This means that currently a programmer is required to upload any new books into the system. We would like to allow text segments to be ordered on a page via drag and drop. Users should be able to request a new root language translation and vote on its addition. If enough votes were added, the system would be able to auto-accept them. This needs to be configurable and administrators should be able to override the functionality to force an acceptance.

3.3 What Can It Do?

We had a number of discussions about how to deal with the user interface. There are a lot of features to fit on a screen intended for a mobile device. Design and development of all of the interacting pieces was complex.

- We created a carousel for sliding horizontally between book covers and vertically between pages (dots seen at the bottom of figure 1 on the right side of figures 3 and 4)
- Sliding panel for going between translations (left and right arrows seen at the bottom of figure 4)
- Translate button to enter translation mode, so as to not inadvertently trigger while reading (pencil icon seen in figures 3, 4, and 6)
- HTML5 “contenteditable” attributes for text editing as well as a modal window for translating (figure 6)
- Save, undo, reset, and close buttons for the modal translation window (figure 6)
- Voting button, which allows the user to vote once and not for themselves (figures 3, and 4)
- Composition of default story translation based on voting by page
- HTML 5 local application caching, which allows for off-line reading

- Templates to provide page structure options, the current default being two segment areas with an image in between.

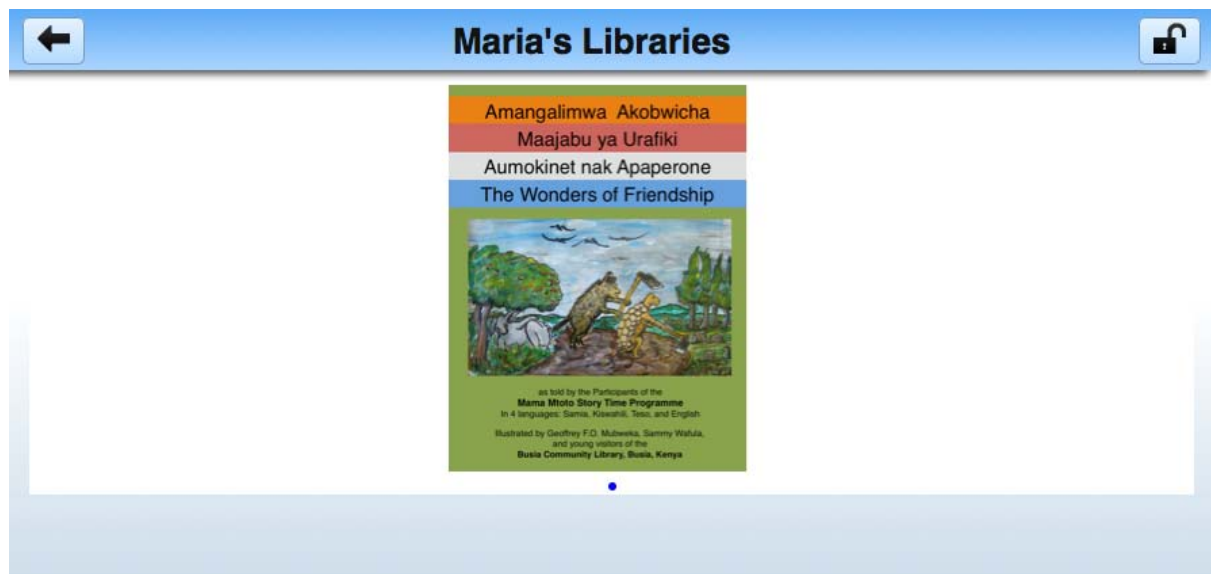


Figure 1 - Book Cover Carousel



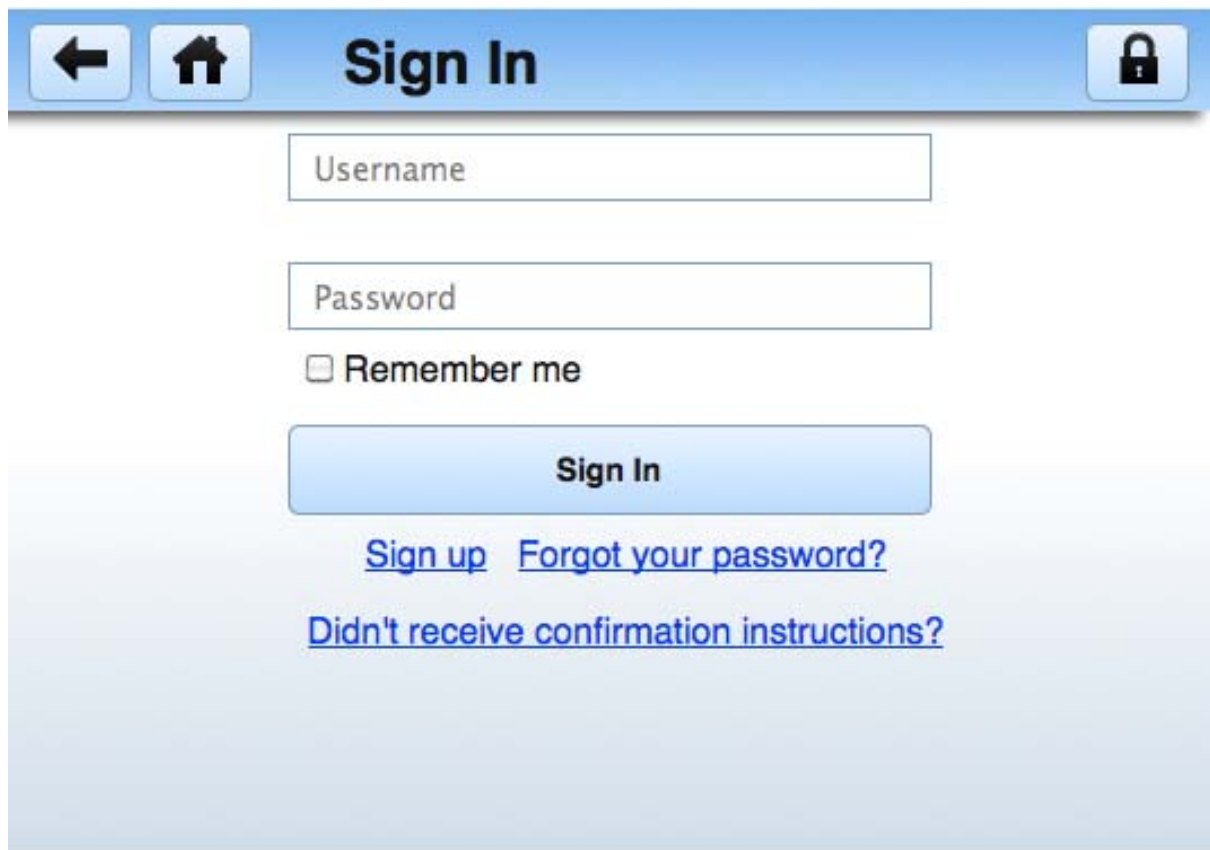
Figure 2 - Home Screen



Figure 3 – Page from Book – Not Voted



Figure 4 – Page from Book – Voted



The image shows a web interface for a sign-in page. At the top, there is a blue header bar with a back arrow icon, a home icon, the text "Sign In", and a lock icon. Below the header, there are two text input fields: "Username" and "Password". Under the "Password" field is a checkbox labeled "Remember me". A large blue button with the text "Sign In" is centered below the checkbox. At the bottom, there are three blue links: "Sign up", "Forgot your password?", and "Didn't receive confirmation instructions?".

Sign In

Username

Password

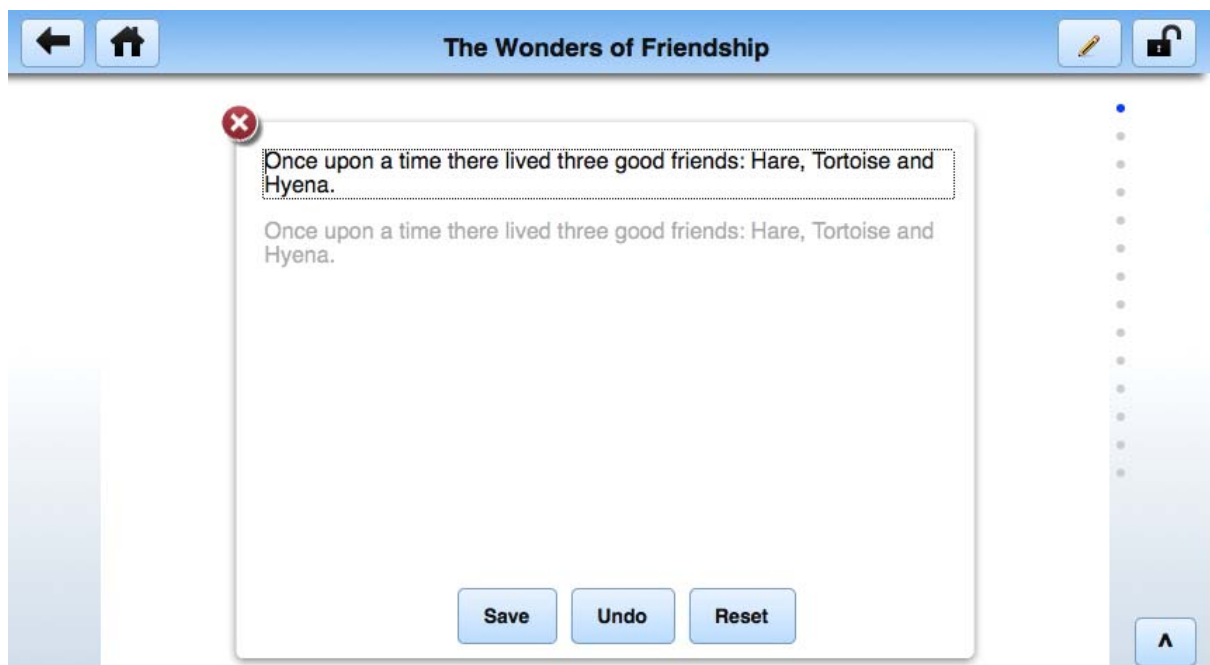
☐ Remember me

Sign In

[Sign up](#) [Forgot your password?](#)

[Didn't receive confirmation instructions?](#)

Figure 5 – Sign in/Log in Page



The image shows a web interface for a translation page titled "The Wonders of Friendship". The header bar is blue and contains a back arrow icon, a home icon, the title "The Wonders of Friendship", a pencil icon, and a lock icon. The main content area features a text input field with the text "Once upon a time there lived three good friends: Hare, Tortoise and Hyena." Below this field are three buttons: "Save", "Undo", and "Reset". On the right side of the page, there is a vertical list of dots, with the first dot highlighted in blue. At the bottom right, there is a button with the letter "A".

The Wonders of Friendship

Once upon a time there lived three good friends: Hare, Tortoise and Hyena.

Once upon a time there lived three good friends: Hare, Tortoise and Hyena.

Save Undo Reset

A

Figure 6 – Translation Page

3.4 Managing Expectations

While we met our deadlines, and were up front about what we could deliver, our partners' expectations of the appearance and functionality of a wireframe were very different than ours. What we gave them was not at all what they were expecting. They assumed we would be delivering a slick interface, which would be ready to wow potential donors, but what we gave them was very much a rough sketch of what the tool could be with further funding. This mismatched conceptualization is a common problem when working with people who are not familiar with tools development. It becomes difficult to explain why a "quick fix" is often anything but, that getting the pieces to work well together is the hardest part, and that getting one piece of the puzzle to work can break several other components along the way. Our programming staff was very upset when we presented a tool that we were rightly proud of, and all we saw were looks of disappointment. In order to provide our partners with something closer to what they expected, and because we felt strongly that the platform has a tremendous amount of potential, we went back and worked on creating a more user friendly tool, adding an additional three months to the deliverable, because we were trying to juggle the enhancements to this project with other planned projects within the libraries and for the press.

4 IN THE FUTURE

While what we ultimately delivered in Phase 1 is still not our final user interface, we created a visually compelling interface potential donors can explore and users can play with. It became something that showcases the real innovation of crowd-sourced translation tools, but still clearly shows where funding dollars will go. Maria's Libraries was able to secure a small grant to hire a local librarian to perform usability testing at their library in Busia, Kenya. She will be testing primarily with educators and parents. At the same time, we will also be doing testing at western universities, particularly with linguists and educators of foreign languages. We expect testing to begin in late May or early June 2013.

4.1 Plans for the Tool

Our original intention of creating a mobile website platform designed to provide users the ability to crowd source translations of folk tales and existing children's books into a variety of African languages and dialects in order to promote and enhance literacy and language preservation was sound. From the beginning we also planned to use the platform itself as a training tool for programmers in Kenya to learn, utilize open source languages and tools, and utilize agile programming techniques. But what we did not expect were the other groups out there who might find this kind of tool useful. What we found was that language studies programs, and individuals working in dead or dying languages were really excited about the tool and how they might be able to integrate it into their work or their teaching. We are very excited about the possibilities of the usefulness of the platform and hope that the open source nature of the tools makes others feel that they can take what we have started and fork it to meet their needs.

4.2 Issues with Building First and Seeking Funding Later

OSU Libraries and Press feels strongly that development is core to our work as an academic and a land grant library, as evidenced by the Open Source development policy found on the home page of our Emerging Technologies & Services department, the group responsible for

development.⁹ By default, all new projects are created in GitHub and are covered under a GPL license. This particular project was developed in a local instance of GitLab, open only to our staff. While our agreement with the staff at Maria's Libraries would allow us to release the code once funding became available, we wanted to hold the code back initially to prevent someone else from developing the tool before we could secure funding, thereby undermining the ability for NGO's like Maria's Libraries to get technology or training funding. This means that it is entirely possible that this project will languish until we can either secure further funding or we all agree that funding is not likely, and we can open it up for further development.

Libraries are facilitators and producers of scholarship, relying on collaboration and the work of the community to thrive. Open Source development does fundamentally the same thing. In 2004, Eric Lease Morgan wrote "People require unfettered access to information (read software) in order build on the good work of others."¹⁰ OSU Libraries and Press feel that Open Source development shares the same values, and that it is important for us to embrace, participate, promote, and create tools that help the global community, whether its in support of literacy promotion, sharing, or access.

5 CONCLUSION

The difficulties of creating an open source platform like this are numerous, but the benefits of participating in the creation of these tools are integral to the future of libraries and our efforts to assist in literacy and technological education. When first conceptualized the idea was to create a tool that did not just provide a platform for reading, but offered an interactive environment to allow the user to interact with the content. Platforms and tools like this provide a nexus where technology, literacy, and engagement co-exist. Our hope is that this tool will find mothers sitting with their daughters working on translating a well-known text into words they can understand together. Communities will decide together on which words best tell their story. That faculty teaching language students in classrooms across the world can find value in having their students translate a text, and work together to select which version conveys the author's intent most closely.

It is important when embarking on any kind of project like this to keep an open mind when developing. The information landscape continues to diversify and it is vital to remember that you never know who might find something you are working on useful. Your audiences are often groups you never thought of, it is always advantageous to err on the side of openness.

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