

Konbit:

Bridging social, cultural, and political worlds by accelerating job growth and creation for the illiterate, disconnected workers

Greg Elliott

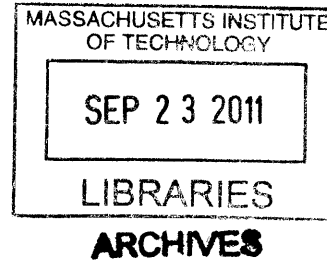
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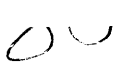
Submitted to the
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Master of Science in Media Arts and Sciences at the
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Abstract

Current employment technology typically relies on the concept of a CV or resumé - a highly precise and constructed document. The creation of this document requires intricate knowledge of a process that is often opaque to those living in developed nations, who rely on training and experience to write compelling CV's. For those living in developing countries, this process is more difficult, and for those that have no internet access or are illiterate, creating a first-world resumé is nearly impossible. That said, when first-world organizations in developing countries bring with them their expectations of hiring which may or may not fit with the natives of that country. We propose a system, "Konbit," that creates a cultural and technological bridge between those with skills in developing countries and those with first-world expectations of potential employees. This platform allows literate or illiterate workers to describe their skills and life experiences as story-like messages in their native language, requires no technological upgrades from these workers, and transforms and offers this data as deep, humanized characterizations of potential employees. Non-profit organizations (NGOs) and government organizations (GOs) can search this data in a technologically modern format, viewing an automatically constructed resumé for each caller. While other systems attempt to create miniature CV's via SMS-based messaging, these systems are not accessible by the illiterate and impose western CV-based culture onto applicants, resulting in low-fidelity representations given that SMS text messages are by nature short and inappropriate for extensive data input.

Given the focus on the most disconnected workers, Konbit deployed and received data from over 10,000 people in Port-au-Prince, Haiti, where the literacy rate, at the time of writing, was around 50% and the unemployment rate was more than 80%. This system was also beta-tested with 30 Haitian-Americans in Miami, Florida. The implications of the thesis will be relevant to any area - developed or developing - that is affected by illiteracy, poor training, or cultural gaps between workers and employers, and may serve as a more effective tool for employee characterization and interviewing in all job sectors.

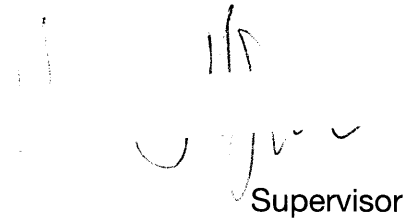
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INTRODUCTION

Creating a resumé requires intricate knowledge of a process that is often opaque to those living in developing countries, and for those that have no internet access or are illiterate, creating a polished resumé is nearly impossible. That said, first-world organizations in developing countries often expect this level of sophistication. We built a system, “Konbit,” that creates a cultural and technological bridge between workers in developing countries and employers with first-world expectations. It allows literate and illiterate workers to describe skills and life experiences as structured, story-like messages in their native language, and requires no technological upgrades from workers. Finally, Konbit transforms the free call into a polished resumé. Non-profit (NGOs) and government organizations (GOs) search this data on a modern website. Other systems attempt to create miniature resumé’s via SMS-based messaging, but this design suffers from poor accessibility and low-fidelity data.

Can we help the excessively disconnected tell their story to foreign employers that expect resúmes and interviews? Can we provide a way for illiterate people to use their voice to explain their life experiences, and translate this information into a medium that employers understand? Can we construct a rich CV for voiceless, that isn’t based on job history, but is based on life experiences? Konbit was developed to attempt to answer these questions.

If we can create a compelling portraiture of an individual that employers can search, and offer the depth of voice and asynchronous interviewing, we suggest that we can create a cogent persona for those that would otherwise not be able to create a resumé. In addition to translating the life story of an individual into skill sets, we allow employers to hear the actual voice message left by the caller to humanize the hiring process.

Our initial trial in Miami, Florida proved to us that voice messages about life experiences provide much more than the text itself: as is known already, many subtle details of a person come through richer communication are better for building relationships (Chalfonte 1991). While not as good as face-to-face interactions, voice can provide cues to confidence, intelligence, honesty, and emotions, in addition to many other cues (Connel 2001). Further, speech allows us to judge credibility based upon paralinguistic features (McCornack 1986).

Following the beta trial, Konbit was upgraded and deployed in 2010 in Port-au-Prince, Haiti and collected data from over 10,000 callers - around 60,000 voice messages - and contains a rich set of skills and life experiences. Our search interface generates resúmes in real-time, including both text and audio for every message of every caller. At the time of writing, Haiti had a literacy rate of around 50% and the unemployment rate was more than 80%. Despite this, we now have 10,000 Haitian workers ready to be employed - NGOs can apply for access and begin hiring workers now.

The implications of our work will be relevant to any area that is affected by illiteracy, poor training, or cultural gaps between workers and employers, and may serve as a more effective tool for employee characterization and interviewing in all job sectors.

Before describing the system in detail, this thesis will cover related work to give a background on this area of research.

RELATED WORK

Konbit is not the first system to approach the problem of job placement in developing countries. It is useful to tease apart related applications in order to define how Konbit contributes and improves on previous models. Assured Labor is a wonderful counterpart to a service like Konbit, focusing on providing trustworthy references and, after initial sign up, working primarily over mobile device - a potential follow-up to clean data that is collected by Konbit. Monster, Hotjobs, Trovix, and the like provide an online service where candidates can fill in an in-depth, extensive survey, and apply for employment. These services target highly-skilled individuals looking for careers. BabaJob is a service in India that helps informal workers, such as guards and cooks, find employment by matching them with employers. The system uses mobile phones to help improve reach into lower-income segments.

All of these systems, however, require some form of literacy (or work around it by relying on those that are literate to volunteer time) and focus on primary skills (traditional resumé services). Only half of Haiti is literate, and the idea of a “primary skill” is culturally uncommon (DeGraff 2010). Additionally, these services provide only text-based self-descriptions, creating a lower-fidelity representation, where Konbit augments this text with powerful voice messages. As a result, there is need for a system that handles these issues and can improve the effectiveness of these other services.

The structure provided by other job services is more rigid and focused on job history. Konbit exposes a person’s life experiences in different segments, be those previous jobs or otherwise. This refocusing of the structure, we propose, in addition to access to the employee’s voice, provides a much richer source of data which employers and visiting volunteers can use.

Further, there is no concrete notion of a “primary skill” or segment of work in Haiti, at least for our target population (DeGraff 2010). For example, I might consider myself primarily a Computer Scientist and Software Designer, with skills in other areas. When I apply for jobs, I typically will focus on that sector as I’ve spent many years advancing my knowledge of that field. In Haiti, however, skill sets are less defined and less career oriented. It was important for Konbit to respect this cultural difference and not impose a sense of a primary job or category on our callers; this is not typically a concern of the related work discussed here.

While we are highly dependent on translation services, the success of efforts like Ushahidi (7) and the large number of Haitian diaspora here lead us to believe we can eventually rely solely on crowd-sourced translation.

ASSURED LABOR

Similar in spirit and serendipitously compatible with Konbit's vision is Assured Labor's approach to low and medium-skilled job placement (Assured Labor). Service providers, such as dog walkers, can post their skills, rates, and references using Assured Labor. Employers, corporate and personal, search for potential employees that are then automatically contacted by Assured Labor via SMS messages. Those interested reply back, allowing employer and employee to connect. By requiring a minimum of two references, Assured Labor helps employers trust and validate those they wish to hire. In this way, this service inverts the model of recruitment by forcing employers to search and prohibiting employees from applying to jobs.

The service is accessible by mobile phone so that it can be used in developing countries where internet access is often limited to kiosks, and has worsened since the earthquake (given that nearly 65% of the country is rural) (Peha 1999, Lucas 2003). Applicants register online to create a profile and wait to be contacted by employers, though it is feasible that this process could be done on a mobile phone as well.

For illiterate populations (especially in developing countries), however, this service encounters several obvious roadblocks: ability to register and create a profile online requires internet access, literacy and, to be successful, a mastery of presenting oneself (Penrose 1984). Further, conveying identity by drawing on a narrative (in the way that Konbit attempts to elicit stories about skills) may lead to better representations (Ibarra 2010). By connecting with local church groups that fill in applications for those that are illiterate, Assured Labor has found a work around for the literacy problem. This solution, however, does not effectively distribute support work because only local residents to donate time to help others find work. Konbit was built with the problem of literacy and internet access in mind, including a requirement that volunteer work be distributed effectively across the world rather than confined to a single locale. The application process is entirely voice-based using a conversational style of question and answer, scales to simultaneously serve as many callers as the telecommunications network can support (as opposed to scale limited by the number of volunteers that can help workers apply online), and distributes load by using a globally-accessible translation interface. As a result, callers do not need additional help to register their skills, can apply whenever they like without internet access, and those that volunteer to translate can donate whatever amount of time they wish, asynchronously on their own schedule. One volunteer may translate a single message, while another may translate several hundred. Asynchronous translation eliminates a need for internet access, literacy, or coordination between volunteers and workers that are applying to Konbit.

Further, Konbit focuses on life experiences versus job history or skills. Assured Labor asks about skills and rates in a typical web-based fashion without cueing memory or structuring input. Konbit's semi-structured input gives room for callers to add whatever information seems relevant,

uses non-elite categories to elicit low-skilled and informal answers (e.g. “first-aid” instead of “medicine”), while also providing several examples of experiences to help callers recall their own experiences. For example, here is how Konbit asks about first-aid:

“If you've had experiences with first-aid, for example, CPR, setting a broken arm, recognizing malaria, bandaging, taking care of an ill loved one for an extended time period, or any similar experiences, press one. If you haven't, press two.”

The examples are disparate and focus on casual life events in order to help callers answer questions about autobiographical memories (Van Vreeswijk 2003, Conway M.A. 2000, Brewer 1988, Kolb 2003).

Lastly, Assured Labor suffers from low-fidelity resumes that are limited to text only, whereas Konbit provides a caller's audio answers

BABA JOB

Dedicated to servicing the most poor, Baba Job combats nepotism and helps give everyone equitable access to employer and employee information. Based in India, it can be difficult to connect local workers with local employers using only non-technological social networks, a problem with Baba Job has helped reduce (BabaJob). Potential candidates can create a profile via mobile phone, kiosks, or field agents. Employers can post jobs as well as search for candidates, and employees can search for jobs - the typical employment model (exemplified by companies such as Monster).

Baba job has been extremely successful, and Konbit's model improves upon their model by eliminating a need for literacy, automatically generating a resume in a format that meets employer expectations, and providing the audio of calls to employers to help them detect dishonesty, confidence, emotion, etc. (McCornack 1986).

Basic mobile phones prominent in developing countries make it difficult to create a high-fidelity resume, a task that is already difficult using a smart phone or a laptop. Because mobile phones are the only method of access in extremely poor countries, many of the profiles on Baba Job lack density; this is likely due to the input method - a non-keyboard-based cell phone is a difficult method to enter detailed descriptions. Konbit's method of life experience collection reduces the difficulty of this task to telling a story or listing skills in an open-ended message that does not require typing, texting, or finding a kiosk or field agent.

MONSTER, HOTJOBS, TROVIX

The least similar to Konbit, these services are most familiar to wealthy countries where previous job history is common, applicants are expected to be literate and provide in-depth, concise, and desirable descriptions of themselves to entice employers. Even if these models were made available to callers via Konbit's method leaving audio messages, the process is extremely in-depth and likely opaque to those not trained in resumé writing; countless examples and classes exist on improving resumé-writing skills, targeted at developed countries (Whitcomb 2006, Bennett 2005).

Monster has made strides to focus more on skills and less on job history (including a search that focuses on skill), but still relies on the traditional resumé model that is so complex it requires what is known as a "Resumé Builder." There is no way to generate a resumé if one cannot read, does not have internet access, or through a ten-minute phone call. Monster exists in 60 countries, but all instantiations exist as localized language versions of the same website and model.

ZUBKA

Easily the most social recruitment platform, Zubka uses social recommendations as a way to fill positions. By recommending a friend, one can earn 80% of the recruitment fee to the person who proposed the winner. This profile is interesting because Haiti has such a powerful community network, where people share phones, skills, relay messages from town to town, that a social-based recruiting platform is interesting to consider. Konbit is well-positioned to use personal recommendations - in fact, the next revision of the system includes a feature to recommend up to two people and their areas of expertise. If an employer hires someone from Konbit and like the worker, they might be keen to use that worker's references next. If workers were responsible for another person being hired, they could earn free training in the area of their choice. Konbit has yet to go this far, but the design could easily include this in the future.

COMMONCV

Lastly, this academic research is related only in that it opens yet another option for improving Konbit. CommOnCV (Harzallah 2002) rethinks how to search and represent a resumé through the use of smart annotations as related to domain ontologies (e.g. Finance, Healthcare). The authors of CommOnCV insightfully note that the revolution in digitized resúmes using sites like Monster.com is not "... accompanied by an evolution of the tools dedicated to the retrieving and the management of CV's and job offers" (Harzallah 2002). Their system attempts to model competency using a fairly simple model that factors in the set of knowledge, behaviors, context definitions required for said competency, and the competencies objective.

Konbit can benefit from and move beyond this model. First, by adapting the CommOnCV model to the data from 10,000 callers, it may be possible to better organize the data. That said, the data Konbit collects may in fact help define the ontologies that are used by CommOnCV's model, providing unique sets of data such as emotion, confidence, as well as secondary skills not captured on typical resumé.

SUMMARY OF SYSTEM

“Konbit” is a Creole word that is defined as a “... traditional form of cooperative communal labor in Haiti, whereby the able-bodied folk of a locality help each other prepare their fields” (Dejean 1981).

Konbit helps disconnected laborers (illiterate with limited internet access), transforming a short phone call into a rich, resumé-like characterization of the person, allowing organizations to better source local labor. To be found, locals (illiterate or literate) call Konbit’s automated service and it helps them record their skills and life experiences as story-like messages. These messages are then translated by volunteers around the world, where Konbit finally crafts the data into personas of potential employees that are easily searchable by NGOs, GOs, and third-party employers looking to perform work in Haiti.

This system is language and medium neutral, where Creole voice and text messages may be translated to other languages through the Konbit translation web interface. We provide an advanced search for potential workers through auto-generated personas of callers, annotation, and one-click recruitment. Not only is this data set unique in its construction and richness of audio, but also Konbit can provide a census of skills for locations and spread jobs more evenly throughout the population by keeping track of who has been hired and who has not.

Given that around 50% of Haitians are illiterate (even more since the earthquake on January 12, 2010) (15), our system uncovers those that would normally be completely disconnected from even the most stripped down services that use mobile texting to create a "mini-cv." Further, unlike other employment efforts, we index skills that one might not typically list on a resumé: we ask if individuals have any experience in construction, repair, electronics, language, leadership, etc. Our goal is to not only reach the highly disconnected, but to create a bridge between the life experiences of workers and the expectations of employers.

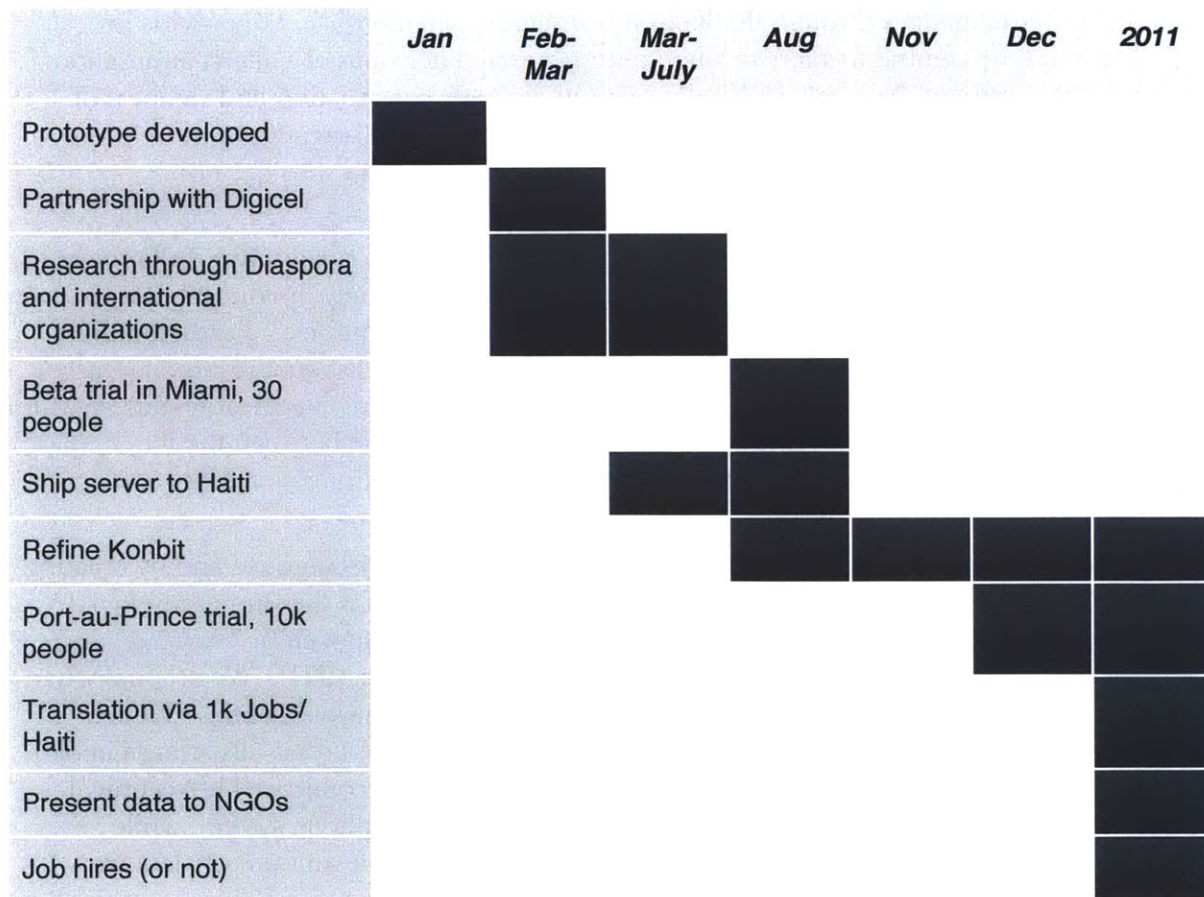
Culturally, we have done this by choosing to use Creole as the primary language and by creating a system that is usable by the literate and illiterate alike. While French is the supposed official language in Haiti, it is actually the language of the “elite.” Creole is spoken by everyone, and only a small percentage of the wealthiest people speak French (Dejean 1981). We originally had French as an option in the call, but were advised against this as callers would choose French whether they understand the language or not in order to be part of that class. By using Creole, we approach the culture cautiously and in a way that respects the country. The technical bridge allows anyone to call in and interact with a relatively low-tech phone system, while employers are given precise and modern tools for navigating the sizable amount of data we generate.

The system works in this way: we solicit skill sets from Haitians over the phone, have those skills translated to English and Creole text via volunteers using our custom website, and then make them searchable and visible via natural language processing and visualization techniques. Technologies were specifically chosen to allow for easy cloning and repurposing of the system. It can be rolled out for under \$5,000 to any country with a telecommunication network.



Figure 1 - Waveform of a single message generated by Konbit

KONBIT TIMELINE



AN URGENT NEED

On January 12, 2010, a 7.0 magnitude earthquake struck Haiti, inflicting massive damage to Port-au-Prince and other areas. Given Haiti's history of chaos and instability (Farmer 1993, Vanholder 2010), the world reacted strongly to the event and began a major movement to help the country, including MIT. Chris Csikszentmihályi and Dale Joachim organized a seminar to discuss how the university could be of assistance. Myself and my colleague, Aaron Zinman, a Ph.D. candidate in the Fluid Interfaces Group at the MIT Media Lab, sat in on the sessions out of curiosity. As we listened to the discussions, we noticed a distinct lack of pragmatic ideas that could be built to help organize or aid Haiti.

At the time, Haiti was in desperate need to find and assist those trapped under rubble or injured, but the cultural differences and language barriers prevented United States operatives from effectively helping all civilians. Ushahidi, a non-profit company that creates open-source software for mapping and more, responded to the situation by working with The Fletch School of Law and Tufts university to create a crisis mapping system that allowed Haitian nationals to ask for help via SMS (7). Their messages were translated by volunteers and forwarded to the United States Coast Guard, and others, who responded to the requests and ultimately saved lives (18).

Inspired by this model, Konbit was created as a method to solve the next piece of the puzzle: rebuilding. The earthquake destroyed most paper records (Vanholder 2010), and the country was in need of workers to remove rubble, rebuild foundations, restore power, fix phone lines, etc. Non-governmental organizations (NGOs) began flying in workers from the United States to work on these issues, in part due to their familiarity with U.S. workers and in part due to language barriers and the difficulty of finding local workers. Displaced Haitians were living in huge camps of tents with little other than a cell phone, and NGO workers attempted to memorize which tents had workers they needed in hopes of finding them when they needed employees (UNDP, PIH, Red Cross 2011). Additionally, they posted signs for work on poles in hopes that among the chaos of homeless and hungry, Haitians would see the sign and call in to be hired (UNDP, PIH, Red Cross 2011).

The problems with this process are many. First, hiring foreign workers does not help the local economy in Haiti rebuild or grow - money donated is simply given back to U.S. workers instead of Haitians. While their work is helpful and needed, there may be an assumption that foreign workers understand better what is needed in the country than its local population. Second, attempting to memorize and locate Haitians puts unnecessary strain on NGO workers when they are already working 18 hour days (UNDP, PIH, Red Cross 2011). Third, posting signs in town is not an equitable way to distribute awareness of employment options and is not an efficient way to find the best worker for a job. Lastly, the lack of transparency about job options creates opportunities for nepotism and unfair distribution of labor and equity.

To compound the problem, Haiti had a 50% illiteracy rate and an 80% unemployment rate before the earthquake.

The challenge was to design a system that would help Government organizations (GOs) and NGOs source local labor without requiring literacy, internet access, or a prototypical job history. Should the design prove useful for Haiti, the idea could be generalized for similarly disconnected populations.

OLD TECHNOLOGY, NEW WORKFLOW

Given the desire to reach the most disconnected populations, it was necessary to make use of whatever technology was most pervasive in Haiti: standard mobile phones (DeMaagd 2008, Cronin 1991). The difficulty with such devices is that they are limited by their archaic input systems - they often do not have a full keyboard but rely on popular technology like T-9. Furthermore, complex messages via SMS were not possible as our intent was to communicate with illiterate workers who may not be capable of parsing such messages. Voice was chosen as a superior input method for several reasons:

- Does not require literacy
- Can allow for more natural flow of information when describing life experiences (Conway 2000)
- Improve trust between caller and system (McCornack 1986)
- Audio messages left by callers contain rich data not present in low-fidelity representations like text (Chalfonte 1991)
- Technologically feasible without modifications to ecosystem due to a focus on mobile phones (DeMaagd 2008)
- Enables communicating large amounts of data quickly by allowing callers to speak stories rather than type descriptions via a phone keypad
- Supports independent application process without the help of others
- Culturally sensitive (e.g. Creole, call does not focus on job history or primary skills, etc.)

With the enumeration of such qualities, it became clear that old technology was not necessarily worse for creating a representative persona. Voice allowed applicants the ability to convey much more about themselves, including confidence, honesty, experience, and intelligence (Connell 2001). Furthermore, Haiti's job culture is not based on the western tradition of a resumé, allowing for the opportunity to change the way a personal representation was created and represented, and possibly in the future, modified.

Creating a resume with a phone call

Typically, resumé's are created in word processing applications or on websites such as Monster. They are of an expected style, format, and content. One can learn to write better resumé's through classes, by paying for critique, etc., and most universities offer help on creating a

successful resumé. The process of generating such a document requires extensive knowledge of how to convey one's skills in a concise manner, in a format that meets the expectations of potential employers, and that differentiates applicants from their peers. It is an understatement to say that this process is often opaque to most people, as is clear from the numerous examples resumé-writing guides (Whitcomb 2006, Bennet 2005).

That said, some people present themselves well in an interview because they can speak about experience, respond to questions, read the social cues inherent in such interactions, and adapt their representation in real-time to suit the potential employer, giving the employer a better read on the candidate (Kinicki 1990). It is fair to say that interviews are often the most effective - though impossibly expensive in terms of time - way to evaluate potential employees, and that resúmes act as a first-pass filter to reduce the number of interviews required. Still, a text document is a poor representation of a person.

Konbit acts as a hybrid between a resumé and an interview: it functions as a resumé in terms of skill and competency listing, but allows for voice capture that acts as a type of pre-interview. This helps employers not only filter based on skill but also filter on the subtle social data conveyed in the voice, creating a richer representation of the applicant (Chalfonte 1991).

Additionally, rather than requiring internet access, typing skills, and literacy, Konbit reduces the process of creating a resumé to a single phone call composed of answering a series of open-ended questions that provide just enough structure for guidance without overly restricting how callers represent themselves. In this way, there is little need to learn a new program or technology, but to instead focus on answering the questions as effectively as possible (in the same way the applicant answers interview questions).

Representing a persona

Once the phone call is complete, we have a collection of data that lends itself to a typical resumé format with a richer profile. The caller does not need to worry about how this data is assembled or presented to employers, such that their data is formatted and presented in a way that is tailored for employing organizations. When an employer sees a person of interest on Konbit, they are able to view an automatically generated resumé, created from a single phone call. A basic resumé usually consists of a name, address, educational history, job history, and sometimes references. Given the lack of education and formal job history, Konbit's resumé currently features the following:

- Name
- Location
- Category of skill (e.g. construction, first-aid, sewing, etc.)
 - Text transcript of audio in English
 - Text transcript of audio in Creole
 - Playable audio message from call for this category

Not only do we present the resumé in multiple languages, but we include the original audio message for that category so that employers can hear the caller's voice to judge their qualities more effectively (Chalfonte 1991, McCornack 1986). This creates the hybrid resumé that has elements of both a resumé and includes the audio messages that can work as a kind of pre-interview.

TECHNICAL DESIGN

Konbit is composed of several distinct but connected pieces. This section will list all hardware used as well enumerate and discuss each software package in detail.

HARDWARE

This hardware was shipped to Digicel in Port-au-Prince, Haiti, mounted in their rack space, and connected to an E1 circuit:

- Dell rack server running RedHat Enterprise
- GSM Modem installed in server
- Digicel E1 circuit, capable of handling 30 simultaneous phone calls

PHONE CALL

Technology used:

- Java on top of FastAGI
- Asterisk
- PostgreSQL
- Jetty for web-based monitor
- Kannel for SMS messaging

The primary purpose of this component is to receive incoming phone calls, interact with the caller via a script of questions, and save the audio files locally. Secondly, its function is maintain a set number of undedicated channels that any caller can take, maintain a set of dedicated channels that are reserved for queued callers, add callers to a persistent queue should more calls come in than can be accepted by the E1 circuit, to dequeue callers and send them an SMS message asking them to call in within two hours to claim their spot, to communicate to callers other status messages, to serve a real-time monitor of calls into the system, and finally react to abuse of the system.

Digicel's E1 circuit can handle 30 simultaneous phone calls, forcing Konbit to have a way to manage a larger number of calls. The system keeps one channel always open to act as a signaling channel, that always can accept a call in order to queue it if the system is full and attempt to dequeue queued callers. Fifteen channels are left open on a first-come-first-serve basis, such that

they are used first to handle calls, and 14 channels are reserved channels that are held for callers that were queued if the system was over capacity. This will be explained in more detail shortly.

The server software is written in Java, bridging to Asterisk to handle calls, and using Jetty to serve any web content. Asterisk, an open-source software implementation of a telephone private branch exchange (PBX), is used to handle the telephone call itself, including answering, button presses, playing audio files, and hanging up. When a call comes into the E1 circuit, it is directed to our server, where the call is processed in this way:

Call ID is checked for abuse (calls from the same number more than 10 times in 6 hours). This limit was set to allow the same phone to be used by multiple callers, given the commonality of sharing phones in Haiti.

Next, if the call is not abusive, the software attempts to route the call into an undedicated channel - a channel that is not already handling a call and is not one of the reserved channels. If there are undedicated channels available the call is accepted and Konbit begins the script of asking questions and recording answers.

If there are no undedicated channels available, Konbit checks to see if any dedicated channels are available. If so, it checks to see if there are previous callers that were queued because the system could not handle their call (e.g., the 31st simultaneous caller), and if so, it reserves dedicated channels for those in the queue and sends them an SMS message to let them know they should call Konbit back to claim their spot within two hours.

If after this process there are still dedicated channels open, the call is routed to the dedicated channel, otherwise the caller is queued (added to a persistent store and sent an SMS message telling them the system is over capacity and we will let them know when they can call back).

KONBIT SCRIPT

Once a call has been routed and the script of questions begins, Konbit runs through a pre-defined script with that caller. The script includes an introduction that explains how the call will work, that it costs nothing, how long the process will take, and what they can expect. Next, the questions begin. Questions take the form “If you’ve had any experiences involving W, for example X,Y,Z, press 1. If you don’t have any experiences in this area, press 2.” W is the category (e.g. construction, medicine, babysitting, etc.), and X,Y, and Z are examples that were chosen to be disparate and functional in priming the memory of callers (Kolb 2003, Conway 2000, Brewer 1988).

To be clear, the question asks if the caller has experience in an area and provides examples to cue memory. If the caller has experience in this area, he or she presses 1 and the call begins recording their voice as a message. If they do not have experience, they press 2 and continue to the next question.

Finally, the script asks about any other skills that may not have been asked about, and what area the caller would like training in. While the script in its entirety and many additional examples can be found in the evaluation section, the introduction and one entire example is included here for clarity:

INTRODUCTION:

“Hello and welcome to Konbit. Our goal is to help you get a job. This phone call takes about 5 to 10 minutes and costs only 1 gourde thanks to Digicel. We're going to ask you simple questions about the skills you have, and we hope you will confide in us. We ask you to trust that we will keep this information safe and use it only to help you get a job. Please be honest with us and tell us as much as you can about your skills and life experiences - telling us more information helps us find the right job for you. Before we get started, please find a quiet place so we can hear you clearly. When you're ready, press any number on your phone to begin.”

FIRST-AID

“If you've had experiences with first-aid, for example, CPR, setting a broken arm, recognizing malaria, bandaging, taking care of an ill loved one for an extended time period, or any similar experiences, press 1. If you haven't, press 2.”

After the question is asked, the caller begins speaking. When they are finished, they simply press 9. The script allows for user mistakes: if the user presses any key other than 9, the caller is asked if they wish to rerecord the message or cancel it completely.

The script for the call was generously recorded for free by famous Haitian radio announcer Bob Lemoine. Originally, the call was graciously recorded by Prof. Michel DeGraff, but early feedback from Haitian Americans at KozeAyiti (26), the University of Miami, Konbit for Haiti (27), and the UNDP suggested that the call felt too automated. Given Mr. Lemoine's fame and his elegant style of speech, his voice was a wonderful fit for this. Additionally, we initially had “beeps” that would signal when the caller should start recording, but we removed these in order to create a warmer, calmer environment that would feel almost like a confession at church. As will be shown, trust is a major hurdle to overcome in Haiti, so the atmosphere of the phone call is important to garnering trust. By modifying the introduction script to ask callers to “find a quiet place,” the system feels less automated and more human.

POST-PROCESSING THE CALL

Technology used

- Tornado Python server
- Sox
- GNUPlot

Once a call has been recorded, and before it is uploaded to a virtual machine at the MIT Media Lab, it must be validated to ensure blank audio files are ignored and files are trimmed efficiently to save bandwidth (a necessity in Haiti). Using Tornado (a Python-based web-server) and SoX (an open-source audio processing library), this process is called by the Java/Asterisk service. The post-processing checks each audio recording from a call for too short of a duration or too low an amplitude, and if the message is silent and short, it is ignored. Next, the processor trims silence off the ends, increases the amplitude to a consistent volume, and converts the file from WAV format to MP3 format. Once finished, the processor uses GNUPlot to generate a waveform of each audio file for use in the translation service later. Lastly, the processor sends a request to the virtual machine at the MIT Media Lab which notes that a new call has been processed and is ready to be fetched.

AUDIO FETCHER AND GOOGLE APP ENGINE PUBLISHER

Technology used

- Tornado Python server
- Google App Engine

Once the post-processor has reported that a given call is ready for fetching, the audio fetcher begins downloading all audio and waveform images for that call asynchronously. This is a Python application that makes sure all recordings and images are fetched and processed, and only posts to Google App Engine (GAE) when all recordings and images for a call have been pulled from the server in Haiti.

In this way, the server in Haiti was designed to be as much of a “dumb pipe” as possible, aside from the script. Because uptime and connectivity are constantly an issue, it is not wise to keep all data only on the server in Haiti (also for redundancy) and instead better to pull all data off that server as soon as possible in case the server is down or destroyed. However, as will be shown

shortly in the translation interface, all audio files need to be present and verified to make sure a caller's data was not lost in transmission. The fetcher has checks to validate the data and, only upon validation, is the data posted to the main storage database on Google App Engine. At the time, the translation and search interfaces were run on GAE which required data imported in a specific format that the audio fetcher supplied.

WEB INTERFACES

Konbit's web interfaces were first created as a generalized translation location that could handle translation from any language to any language, built on GAE for scalability. This solution was over-engineered and became a difficult ship to steer. This is mostly due to the tradeoffs required for serious scalability, typically giving up agility of development. Eventually, Konbit was moved completely off GAE into a Tornado server and Mongo database pair, resulting in superior user interfaces, faster development time, and easier data mining. This transition was non-trivial because GQL and Mongo are so fundamentally different, requiring several exporters and importers to be written, each processing and storing data in a way that was importable by the receiving database. In addition, the back-end Python code for all three interfaces (translate, search, search import/export, tagging) also had to be re-written as GAE's Python interface is different than Tornado, and interactions with the database were completely different with Mongo than with GQL.

TRANSLATION WEB-INTERFACE

Once a call has been recorded, processed and uploaded, it is ready to be translated. Again, audio messages must be translated before they can be searched. Given the requirements for low-cost and inspired by the success of Ushahidi's crisis mapping, translation was created as a way to crowd-source translation. It was hoped that, similar to Ushahidi, volunteers could access this interface and help as little or as much as they liked.

The translation interface itself has had two distinct versions, each of which will be described.

Version 1

Technology used

- Google App Engine
- Python
- Solr

- Lucene
- HTML/Javascript/CSS/JQuery

The user interface also suffered due to the generalized structure, where a more approachable experience was sacrificed for scalability. The back-end used GQL and an Expando model to accommodate the variability in the number of fields that a call may contain, as well as future-proof the model should we need to add more fields in the future (as we did with “Babysitting,” “Sewing,” etc.). Python on GAE was used for its ease of rapid prototyping which was appropriate given the speed at which the situation in Haiti was progressing. A Google login was chosen as the method of authentication due to the ease of creating an account, the universality of the brand, and the ease to which a Google login was implementable on GAE.

The user-experience allowed users to choose the languages they could help translate, with options limited to English, Creole, and French since the first target country was Haiti. Next, the user was brought to the main translation interface, which consists of an audio file and its accompanying waveform, controls for the audio player, a text box for entering the translation, and buttons for each language the translator spoke as depicted in figure (Figure 1). The system automatically chose a message at random that needed to be translated and loaded it into the interface. The translator would listen to the audio message, enter a translation, and save it by clicking the appropriate language button (e.g. “» English”). When the translator had translated or transcribed the message into whatever languages he/she wished, the “Next” button was pressed which loaded the next message to be translated. The audio file was embedded using a Flash object that relayed Javascript callbacks for events such as loading, pausing, rewinding, errors, etc. This allowed the front-end to control and be notified of the Flash objects state. Back-end saves were AJAX-based to cause as little interruption as possible.

After four messages translated, the system would ask the translator to verify a message translated by someone else. The interface simply showed the text that was entered by another translator along with the audio message, allowing the translator to click the “Right” or “Wrong” buttons to validate the translation. If a translation was right, the translator of that message had their reputation increased, and if it was wrong, the reputation was decreased and the message was sent back to the queue to be translated. This allowed us to monitor translators and automatically block those that were not contributing correct validations. So far, none of our validators were inaccurate enough to warrant rejection.

Several issues plagued this interface, despite its simplicity. First, the single text box was meant as a “scratch pad” that allowed translators to first transcribe Creole, save it, then use that Creole transcription to translate into English. Unfortunately, this workflow was opaque and several translations were stored with both English and Creole in a single field. Next, if an audio file was bad, missing, or not translatable, a “Skip” button allowed translators to move on without translating this message; however, the back-end did not store this information in a useful way, and it was unclear from the interface what would happen if skip was pressed. Additionally, when marking a translation as incorrect, the user was not asked to correct it at that moment - a technique that would yield immediate corrections by the person that had enough expertise to spot a poor translation.



Figure 1 - the main translation interface, which consists of an audio file and its accompanying waveform, controls for the audio player, a text box for entering the translation, and buttons for each language the translator spoke

Version 2

Technology used

- Tornado Python server
- Mongo db
- Solr
- Lucene
- HTML/Javascript/CSS/JQuery

Once Konbit was moved to Tornado and Mongo, the call data was consolidated and became more fluid in structure. This was important for creating a better user interface as it allowed for queries and requests that were extremely difficult with GAE, such as finding the next translation in the queue. This was part due to the database design in GAE, and part due to the tradeoffs required for GAE's scalability.

The new system was able to better sort messages that needed to be translated, allowing an entire person's data to be translated at once. Previously, messages in the queue were mostly random and it was difficult to have any one person's data completely translated quickly because it was primarily a breadth-first search. Mongo allowed for us to do a depth-first query, allowing a single person to be finished and inserted directly into the search interface for the fastest turn around time from call to showing up as a search result.

To further simplify the interface, the language selection field was removed and replaced with a workflow where users could translate what they could, save the text, and move on (Figure 2). That message would remain in the queue until it was translated to both English and transcribed to Creole, guaranteeing that each message was fully translated. Additionally, a text box was given for each language, reducing confusion about what translation should go into which box. An "Audio is bad or missing" button was added as a clearer way to mark bad audio files, and the back-end stored this data more effectively by marking it on a per message basis. Validation was also improved such that if any part of the translation was incorrect, the user was asked to fix the translation and save it.

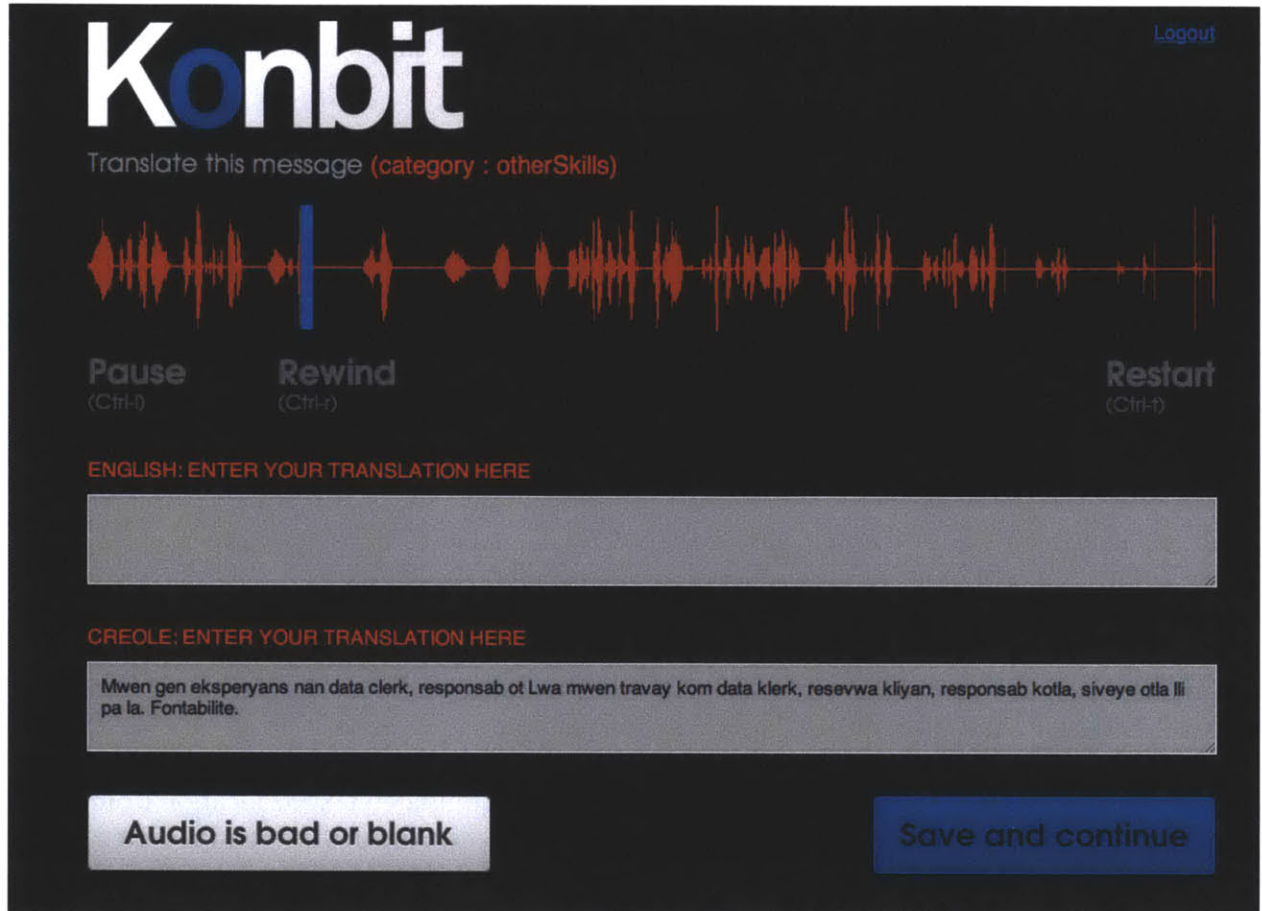


Figure 2 - The second version of the translation interface was modified based on user feedback about the confusing nature of a single text box and multiple buttons. A clearer button for marking bad audio was added.

Improved data collection on the back-end include marking a message as checked out, marking who checked it out, and setting default times to check that message back in should it not be translated after several hours. In this way, each message that was translated has its translator, a timestamp, its validation or not translatable status.

Translators were happy with the improvements, and the speed of translation has increased.

SEARCH

As the culmination of all the processing that preceded it, the search interface is a critical piece of the puzzle. It is the interface which employers, NGOs, and GOs use to sift through the call data. Thus, search features several functions to reduce a complex process to a minimal and focused interface. It should be noted that access to Search is limited to those that apply for membership

and are personally approved by myself and Aaron Zinman. The data collected during these calls is private and confidential, thus opening it up publicly without restriction is unacceptable.

Version 1

Technology used

- Google App Engine
- Python
- Solr
- Lucene
- HTML/Javascript/CSS/JQuery

Built on GAE, search helped employers target potential employees by using a three step process to breakdown the workflow into skills needed and location desired (Figure 3). Skills needed was simply a text box to specify skills like “concrete pouring,” location desired was a text box for specifying a location and also showed the top locations from the calls (the phone call asked about location, so the location was shown as the text of that message), and the acceptable distance was a choice between 1 mile, 5 miles, and more. Locations were shown as the text of messages from calls because addresses in Haiti are unlike addresses in places like the US: often an address will simply describe an area (“near the brown building”), so the translated text of location from the phone call was superior to something like a zip code or GPS coordinate (UNDP, PIH, Red Cross 2011).

Konbit

Welcome, CHF International.

1 WHAT SKILLS DO YOU NEED?

2 WHERE DO YOU NEED THEM?

Type the skill you need here

Type the location of the job here

OR CHOOSE FROM POPULAR SKILLS

FIRST-AID nursing

CONSTRUCTION pour concrete
 ditch digging
 build fence
 plumbing

REPAIR fix water pump
 fix fence
 can repair gate
 make electric switch
 pour concrete

TRANSPORTATION drive car
 big truck
 own car

OR CHOOSE FROM POPULAR LOCATIONS

cambridge, massachusetts

SEARCH

Greg Elliott and Aaron Zinman

MIT Media Lab

Limited Beta Release

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Figure 3 - Version 1 of the search interface required both a skill to search for and a location. It featured popular skills and locations based on actual call data.

Once these three attributes were chosen, a query was performed. In order to support full-text searches, the search interface uses its own database type: Solr, an open-source database based on the Lucene Java database. Running as a separate server, this database is built for string queries, allowing stemming, faceted search, dynamic clustering, and geospatial search. Additionally, it features a REST API for easy integration. In order to move data from GAE, a bulk exporter was written to save the data as a CSV, and a bulk importer for Solr was written. Searches on the database were configured to return near matches, such as “Plumber” if a search was “Plumbing.”

Results for a search contained the following: name, location, full text that contained search term, a recruit button, and an audio object that played the original audio for that message (Figure 4). The search term was highlighted within the search, though the results were very basic. This was effective as a proof of concept, but was not rich enough to properly represent a person as has been claimed so far.

Konbit

Welcome, **Red Cross**. Search and hear the skills of Haiti.

1

WHAT SKILLS DO YOU NEED?

2

WHERE DO YOU NEED THEM?

nursing

CLICK TO CHANGE ▾

CLICK TO CHANGE ▾

1

Goeran Berly. Yes! - Mayami

medicine This person worked with the Red Cross in Haiti, and is currently a certified **NURSING** assistant in the US



RECRUIT

2

My name is Marie Louise. - I live in Boston,MA

language Before going to **NURSING** school I used to translate for a hospital, prison and court. I was a translator for a court, hospital and prison.



RECRUIT

3

My name is Marie Louise. - I live in Boston,MA

leadership I'm a HIV health coordinator. I'm a graduate nurse. As I was saying I'm a health coordinator to give people tests, counsel and then organize medicine for people sick with HIV.



RECRUIT

Figure 4 - Search results showed text from phone calls that matched search terms, highlighting the words in the text that match, an audio player to play the original message of that text, and a recruit button (which was meant to text message callers directly with a job offer, but was never made operational before version 2).

Version 2

Technology used

- Tornado Python server
- Mongo db
- Solr
- Lucene
- HTML/Javascript/CSS/JQuery

After switching from GAE to Mongo, again the user interface was vastly improved due to the ability to perform certain queries.

First, the initial search was reworked to feature three distinct ways to search: choosing from common skills found in the data (e.g. plumbing, truck, etc.), choosing from curated tags (described in the next section), or by entering a custom search query (Figure 5). Location was removed because it was not a differentiating factor for NGOs with whom we spoke. The primary issue with the previous interface was the lack of transparency to the data - a blinking cursor in a text box does not expose what the options are. By bubbling up common search terms (terms that occur in at least 20% of messages), it becomes easier to get a sense of how the data looks, what options might be, as well as prime a user for how to search for a skill. These common skills are clickable, performing a search on that term.

Curated tags are summarizing terms that help categorize messages (e.g. empathetic, multi-lingual, tacit knowledge, etc.) and provide a more abstracted layer to search on. This can be effective when a particular skill is not needed, but people with specific training needs are required (e.g. IT Training). These tags are created using the tag interface that will be detailed in the next section.

Results were vastly improved as well, adding to the set of features from the previous version. The largest change was incorporating an automatically generated resumé for each person in the result (Figure 6). To the left of each result is a button labeled “View Resumé,” that would display a modal window that looks much like a resumé. It features name and location prominently at the top, followed by headings for each category the person has skill in (e.g., Construction, Repair, etc.), the translated text of that skill, and most importantly, the audio message as a playable object.

Konbit

Search and hear the skills of Haiti.

Type the skill you need here

SEARCH

COMMON SKILLS OF KONBIT CALLERS

CONSTRUCTION Plumbing
Mason
Carpenter
Concrete
Iron worker
Electrical

COUNSELING Advice
Trauma

TRANSPORTATION Car
Truck
Water

SECURITY Bodyguard
Guard

CURATED TOPICS BASED ON CALLERS

TAGS

Accounting Training
Agriculture Training
Computers
Diabetes
Driving Experience
Economic Training
Empathetic
Engineering Experience
Environmentally Conscious
Experience With Kids
First-Aid
Hiv Experience
It Experience
It Training
Language Training
Management
Management Training
Manager
Medical Student
Medium-Skill
Medium-Skilled
Multilingual
Office Experience
Plumbing Training
Teacher
Translator

Figure 5 - Version 2 of search removed location because calls originated in Port-au-Prince and location was less of a factor for employers (based on their feedback), high-level hand-curated topics were added to help summarize the data, and featured only a single search box for custom searches.

The resumé view is critical because it is the final step in the transformation of a phone call into a resumé (Figure 7, Figure 8). It contains all the data from a 10-minute phone call presented in a representation that is consistent with employers' expectations by appearing as a standard resumé, and additionally contains the original phone call's audio split over the messages. The audio is important because it conveys much more than the text alone, including dimensions like confidence, honesty, experience, emotion, and so on (Chalfonte 1991, Connell 2001). Thus, the presented resumé is in some ways superior to typical western

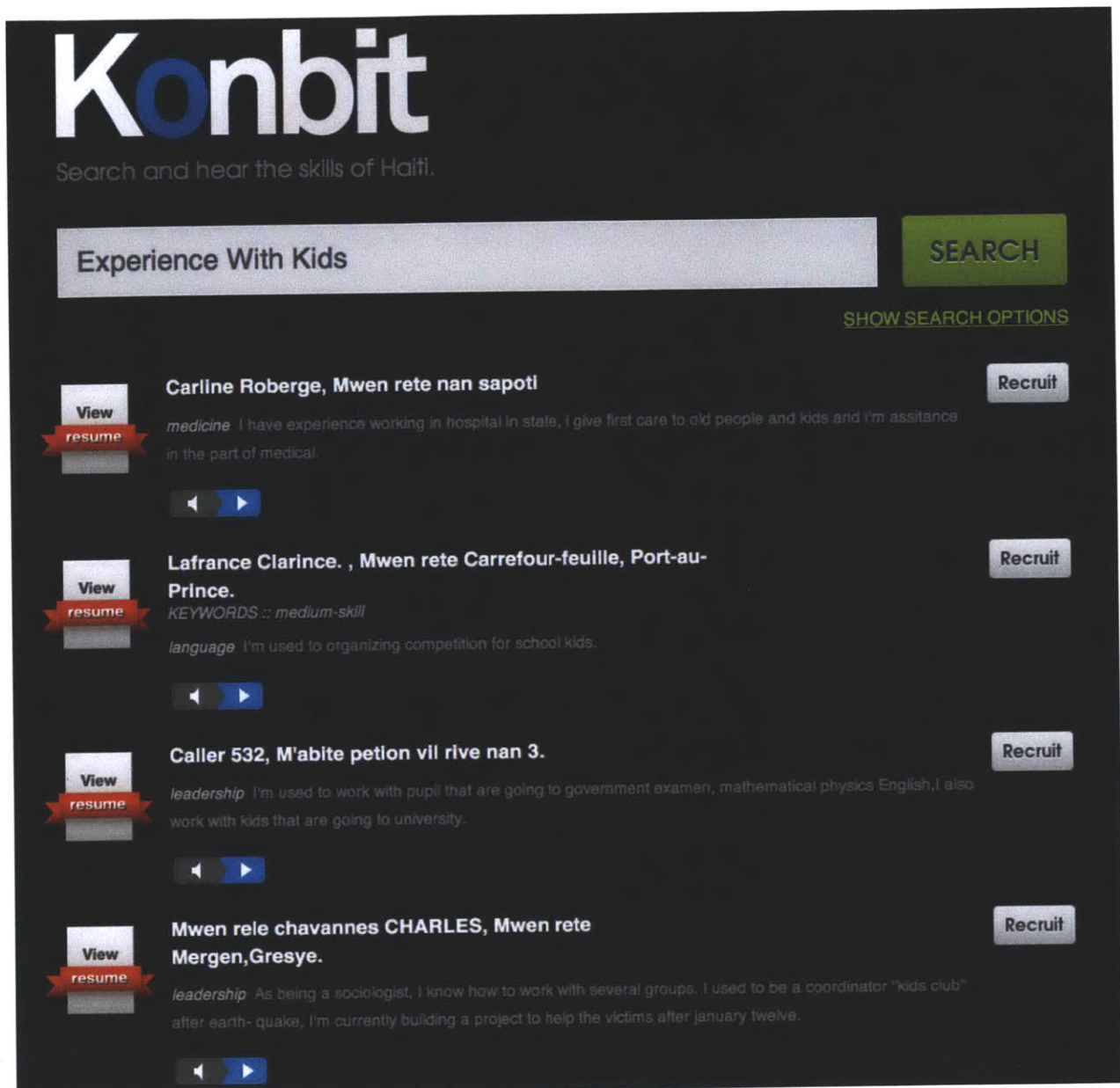


Figure 6 - The second implementation of search results included a resumé button, keyword summaries, much faster search results, and a recruit button that provided the employer with a phone number to get in contact with the caller.

resumés because of this rich characterization. Finally, the caller has in no way had to understand or work around a tool in order to create this representation of themselves: a conversation with an automated machine becomes a functional resumé, creating a cultural (job experience and representing that data) and technological (simple phone to complex website) bridge between employees and employers.

Lastly, curated tags are shown along with the caller's message that matched the search string, and the recruit button displays the phone number of the caller in order to contact them. In the future, recruitment should send an SMS message to the caller asking them about work, but we have not

solved the illiteracy issue in terms of recruiting. The phone number allows an employer to talk directly to a worker, which is currently an acceptable method to begin an interview.

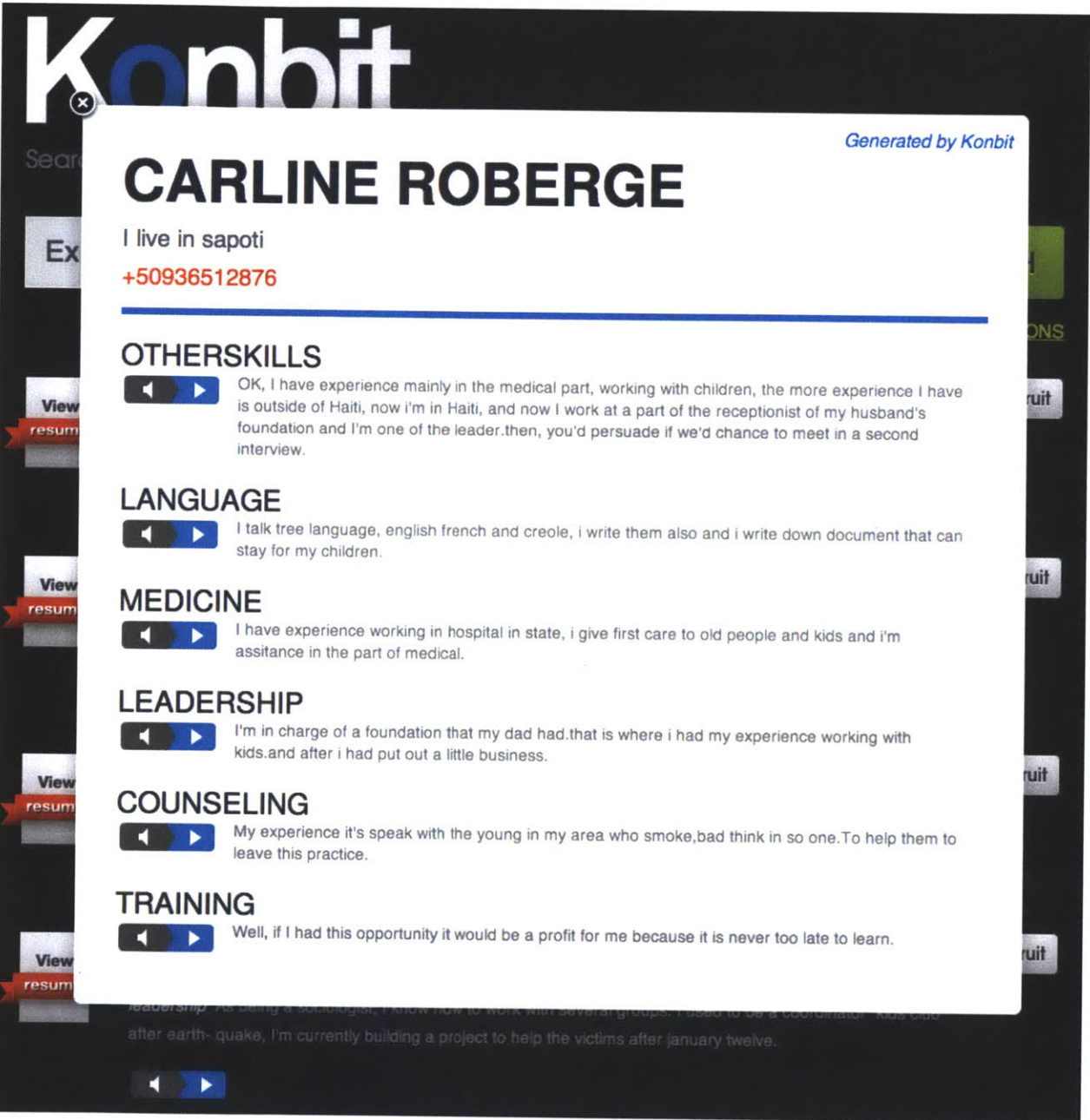


Figure 7 - A new resumé view was the final step in converting a single phone into a polished resumé, complete with audio messages from the original call.

Konbit Generated by Konbit

CARLINE ROBERGE

I live in sapoti
+50936512876

OTHERSKILLS

OK, I have experience mainly in the medical part, working with children, the more experience I have is outside of Haiti, now i'm in Haiti, and now I work at a part of the receptionist of my husband's foundation and I'm one of the leader.then, you'd persuade if we'd chance to meet in a second interview.

LANGUAGE

0:10 can stay for my children.

MEDICINE

I have experience working in hospital in state, i give first care to old people and kids and i'm assitance in the part of medical.

LEADERSHIP

I'm in charge of a foundation that my dad had.that is where i had my experience working with kids.and after i had put out a little business.

COUNSELING

My experience it's speak with the young in my area who smoke,bad think in so one.To help them to leave this practice.

TRAINING

Well, if I had this opportunity it would be a profit for me because it is never too late to learn.

Figure 8 - Employers can play the audio without leaving the interface, for a quick way to access the richness of the call without interrupting search flow.

TAG

Technology used

- Tornado Python server
- Mongo db
- PostgreSQL
- HTML/Javascript/CSS/JQuery

As it became clear that summarized keywords would help refine search results, a tagging interface was built that allows myself and Aaron Zinman to look at each auto-generated resumé and add keywords to a person, such as “Confident” or “Low-skilled” (Figure 9). Over 50% of the messages have been tagged, and the interface uses auto-completion and keyboard shortcuts to create an efficient mechanism for tagging.

NAME

I'm Michel kerley-grand

LANGUAGE

I studied communication at Human sciences faculty. I speak English and Spanish fluently and as a reporter I used to translate texts.

LEADERSHIP

I was head of credit in a bank, I was in a team that had four people, I was the chief for this team and I was responsible of credit in another enterprise on the market. I have two or three people on my responsibility.

LOCATION

I live in Delmas

TAGS

medium-skill,management,multilingual|

SAVE

NEXT

Figure 9 - The tag interface allows only us to add hand-curated, high-level summaries of call data to make searching easier for employers

CHALLENGES

Deploying an advanced service like Konbit into a country with very poor infrastructure shortly after a major disaster is non-trivial. Building that system to custom-fit the technical, socio-political, cultural, and economic constraints in Haiti compounds the problem and presented numerous hurdles to overcome. This section will document these challenges, how they were overcome (if they were), lessons learned, and how Konbit has reduced or eliminated some of these challenges for future projects by others.

TECHNICAL

VOIP or not to VOIP

Running a service like Konbit in the United States would be significantly easier, as the entire system could be written to use Voice-over-IP (VOIP) using a custom service or piggy-backing on something like Twilio, the files stored from the call could be directly saved to the database, the server could be entirely virtual (using a virtual machine), and the cost of a 10-minute phone call over VOIP would be less unreasonable and less of a deterrent.

While there are internet access points in Port-au-Prince, using a VOIP solution would greatly restrict the access of those that are displaced, far from the access points. Even if the access points were numerous and coverage was reasonable, the intermittency of the connections outside of select locations is high (UNDP, PIH, Red Cross 2011). Further, using a server in the United States to handle calls over VOIP from Haiti would require prohibitive phone call tolls. Haitian nationals do, however, have direct access to traditional mobile phones, either owning a phone or by sharing with family or neighbors (UNDP, PIH, Red Cross 2011). Traditional telephone networks would give Konbit the greatest reach, especially given the destruction of the earthquake: mobile phone networks were one of the first services to be restored after January 12, 2010. Again, an entirely SMS-based service would alienate illiterate workers in a country of around 50% illiteracy, not to mention creating a low-fidelity persona (due to the fact that simple mobile phones are poorly suited to lengthy personal descriptions (15, Chalfonte 1991). Internet-based kiosks would not solve the access point problem, as creating enough kiosks to service Port-au-Prince would be prohibitively expensive. Thus, the path was clear: find a way to work with traditional phone networks.

Local or international

Once this was decided, it was necessary to determine how to make phone calls to Konbit affordable or free for callers. Placing a server at M.I.T. or anywhere in the United States to handle the calls would require Haitians to call internationally, which was previously noted as too

expensive. If a server was to be shipped to Haiti, should it handle all functionality or should it be as dumb as possible? The answer was the latter: if we are unable to access it due to another disaster or for some other reason due to instability, likely in Haiti, it was unacceptable to lose data and state. The machine in Haiti needed to act like a relay that was responsible for handling phone calls and then sending the information asynchronously to a server at M.I.T.

These constraints forced the use of traditional phone networks and direct access to the telecommunication backbone in Haiti - pointing toward a partnership with a company in Haiti. Voila and Digicel are the two largest telecommunications companies in Haiti, but talks with Voila were futile. Digicel, however, was receptive to the idea and has a long history of humanitarian work, sponsored by the Digicel Foundation. Angela Dean, of Dean LLC, acted as our political guide who was able to connect us with David Sharpe, head of product development at Digicel. After several months of discussion about how Konbit could work within the Digicel eco-system at a reasonable budget, a Memorandum of Understanding (M.O.U.) was signed that featured several key points (full M.O.U. included in appendix):

- 3,000 person trial
- \$400 for first month of data center usage (1 E1, rack space), \$800 for additional months (if needed)
- Free incoming calls to E1
- Free outgoing texts (3 per person expected, 6 per person maximum)
- 512 KB / sec data
- Separate dedicated IP and < 64 KB / sec for remote management

This allowed Konbit to run a small user evaluation in Haiti with free phone calls for up to 3,000 callers. The generous contract was a huge step forward for the project. The following network diagram illustrates how Konbit's hardware was to be set up (Figure 10).

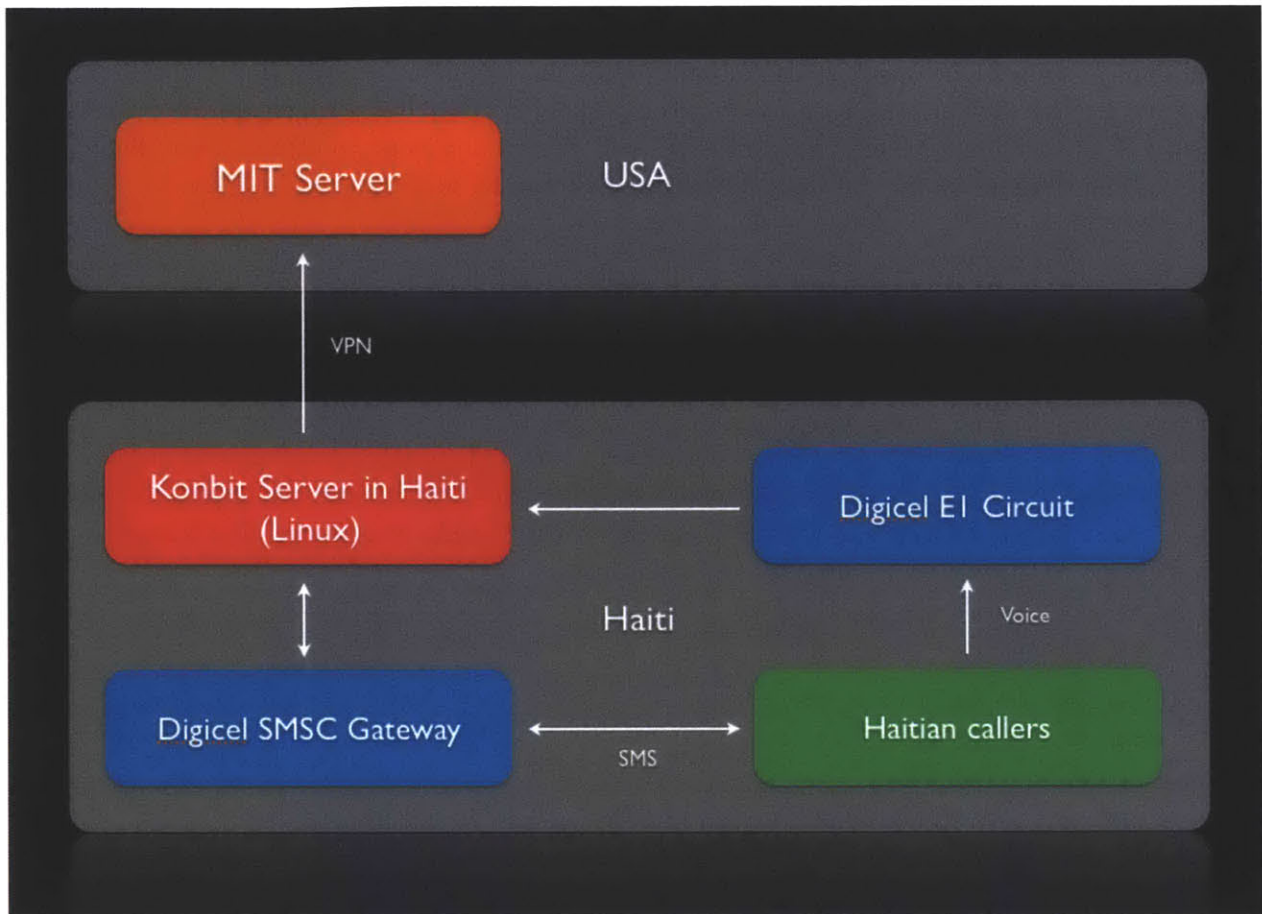


Figure 10 - A network diagram for Konbit's hardware and information flow.

Customs

After researching the network connectivity options in Haiti, a Dell server was graciously donated by Frank Moss, former Director of the M.I.T. Media Lab, a GSM modem for SMS messaging was purchased and tested using TMobile's network and Asterisk, and a T1 card was purchased for talking to the Digicel E1 circuit. RedHat Linux Enterprise was installed and configured, but there was no guarantee that the server would properly talk with the E1 circuit until it was tested in situ. Since testing in Haiti was not an option until it was shipped and non-retrievable, the server was tested at M.I.T.'s IS&T Switch Room by custom wiring circuits to their phone lines. After several tests and configuring changes, the server was ready. The difficulty here was that shipping to Haiti requires a pass through customs, which can take between eight to twelve weeks depending on the mood of the customs agents (UNDP, PIH, Red Cross 2011). Retrieving the server to reconfigure the card jumpers was not an option, thus it was necessary to get it right the first time.

Translation

Human translation was necessary because current translators do not have the capability to translate Creole effectively, and the correct translation of a message could be the difference between a person getting a job or not. We have designed a second version of the Konbit script that requires fewer, richer open-ended questions by using standardized yes / no questions, thereby requiring less translation for each person. Another option is to use Google translate to do a first-pass on the data and have translators verify and fix the automated work. Perhaps this route will also be explored in the future.

SOCIO-POLITICAL / CULTURAL

Haiti is significantly below the economic status of all other countries in the hemisphere - average per capita income were around \$250 in 2001 (Smith 2001). The majority of the population lives well below the World Bank's absolute poverty line (Dupuy 1988). Aid comprises the bulk of the country's national budget (Smith 2001, Meme 1996). Organizations have descended upon the country with relief efforts in mind since the 1940's, and have gained such power that "they have supplied many of the services that governments are generally expected to provide: roads, potable water, medical clinics, schools" (Smith 2001). The international aid given to Haiti serves to increase the gap between rich and poor, only helps a small minority of Haitians, and hastens its impoverishment (Bajeaux 1994).

Haiti has been severely damaged by many foreign campaigns, such as the USAID Export and Investment Promotion Program which decreased real-wages by nine percent and forced thousands of rural Haitians out of their homes (Smith 2001, Diederich 1985). The "Swine Aid" calamity was a United States funded program from the late 1970's that unnecessarily eradicated the entire population of pigs in the Dominican Republic for fear of swine flu that had completely died off in Haiti. Haitian pigs were so critical to agriculture and to the peasantry that it is oft-equated to the Haitian peasant's Great Stock Market Crash (Smith 2001, Abbott 1988). To replace these pigs, the Programme pour l'Eradication de la Peste Porcine Africaine et pour le Développement de l'Elvage Porcine (PEPPADEP) sent foreign pigs (not similar to the destroyed Haitian pig) with the stipulation that the pig be housed in "tin-roofed, concrete-floored shelters." This meant, however, building nicer housing for the pig than the peasants could afford for themselves and their children.

Smith's personal experience with a description of the Haitian masses that consists of "a preference for dependency on more powerful others ... a fatalism leading to apathy and resignation; an inability to think analytically or constructively about the situation; and a chronic resistance to working cooperatively and effectively in the interest of the collective good" (Smith,

2001). The “very foundation of the theory of and practice of the development industry [in Haiti] ... is the modernist premise that causes the Third World poverty to reside not in the forces that enrich and empower the few of the world’s people and immiserate the rest but lie instead in the deficiencies of poor people and the communities in which they live” (Smith, 2001). Still, a number of agencies have attempted to “resist imposing their own preconceptions and agendas on local communities,” but often these organizations are small in “budgets and staff” (Smith, 2001).

Konbit, at a foundational level, assumes that even illiterate and disconnected Haitian peasants and nationals have skills, want to contribute to their community, and can think constructively about their situation. The service assumes that creating a channel that allows Haitians to more effectively communicate their abilities to employers will allow these passionate workers to help themselves. Further, Konbit was built to avoid imposing preconceptions and agendas on callers in several ways.

First, the entire phone call is conducted in Creole, rather than French. At first, callers were given the option to speak in English, French, or Creole in order to, as we assumed, provide a neutral medium for the call. After many conversations with Haitian Americans at the United Nations Development Program (UNDP), Prof. DeGraff of MIT, Prof. Joachim of MIT, Maggie Austin and Marli Lalanne of Konbit for Haiti (KfH), Tod and Yanick Landess of The University of Miami, David Sharpe of Digicel Haiti, and Gregory Milne of the Clinton Foundation, and countless others when we spoke at conferences (such as speaking at the State Department in Washington D.C.), it became clear that offering French was a poor decision. French is only spoken by a small percentage of Haitians, whereas Creole is spoken by nearly everyone. Despite this, text books are in French even though most children can’t read French well. French is seen as the language of the powerful, thus it is often advantageous to report that one can speak French to appear to be of higher-class. By offering French as an option for the call, Haitians would choose it over Creole in the hopes that it would, politically, make them seem like a better candidate. The final call was offered only in Creole so as to eliminate the effect of language on the potential caller - an effective way to not impose centuries of political oppression. Konbit avoids this effect, despite our initial preconceptions that offering more languages would be more politically neutral.

Second, one way to create yet another job recruiting platform would be to focus on jobs rather than skills. For example, Konbit could have asked questions like, “Are you a nurse?,” or “Have you worked as a secretary?” The problem with this approach is that standardized job history is less relevant in Haiti than it is in places like the U.S., so the questions do not fit the culture. Instead, Konbit focuses on life experiences in order to extract skills through personal stories. Questions in the system focus on broader areas, like first-aid, leadership and counseling, in addition to concrete categories like construction and repair. Further, each question offers unique examples of that category so as to lead callers away from attempting to define themselves as a “mechanic” or “babysitter,” but instead focus on events that have happened in their life that reveal characteristics and skills indirectly. The effect of this is hoped to be three-fold: one, it creates a more conversational, less formalized interview that may create a more trust-worthy situation, two (more importantly), it allows callers to expound on events and stories that Konbit does not ask about directly, and three, it creates a semi-structured narrative where callers simply

“fill-in the blanks.” Fortunately, the data from 10,000 callers shows that this worked well for the most part, as will be discussed in the evaluation section.

A semi-structured guide needs to be clarified. The call is intended to function much like an audio “Mad Lib,” where a story is being constructed with blanks for callers to fill-in. The idea is to provide enough structure to make the data useful and guide callers while allowing enough freedom to shape the story as they see fit.

PARTNERSHIPS

Konbit would not have been possible without numerous partnerships, many of which were not easy to obtain. The list of necessary collaborators includes political advisors, cultural advisors, Haitian advisors, University partnerships, church partnerships, telecommunications partnerships, and more. It is important to explain why each partnership was needed, how they were established, and the net effect of the partnership on both parties.

General partnerships

We have received endorsement from the MIT Media Lab director Frank Moss, MIT Lincoln Lab, and have worked with Massachusetts State Representative St. Fleur. Technologically, we have received support from Google and their Google.org department. We have contacts at Partners-in-Health that are ready to put us in touch with additional NGOs when we are ready with our data.

Michel DeGraaf is an MIT Associate Professor of Linguistics, and has helped us translate our work into Creole, has recorded our phone system audio in English and Creole, and helped us make connections with Haitians in Port au Prince for our ethnographic study.

Our latest call was recorded by famous Haitian radio personality Bob Lemoine in addition to our Public Service Announcements, and we are in contact with CECOSIDA in Haiti for press coverage.

D&A Consultants

Angela Dean of D&A Consultants was responsible for opening many doors for Konbit. A personal acquaintance, we spoke with her about the idea for Konbit, our need for a contact to Digicel, and a need to begin reaching out to NGOs that might be possible employers. She was interested in helping us given her philanthropic background, and because she takes it upon herself to help projects like Konbit get off the ground. She gets little more than reputation out of it, but in her business, that currency can be quite useful.

Shortly after speaking with her on the phone, she began speaking about Konbit with Dennis O'Brien, Digicel Group Founder, Chairman, and Patron of Digicel Haiti. Next, she started researching the Clinton's Special Office to the Envoy for Haiti. She did background research on programs similar to Konbit and quickly gave us the "go-ahead" on the project. Within a week, she had set up a phone call with David Sharpe of Digicel Haiti to speak about a collaboration between MIT and Digicel Haiti to get Konbit launched. Obviously successful, the Digicel partnership will be discussed shortly.

Once paired with Digicel, Mrs. Dean moved forward on connecting us with organizations that could help us fund Konbit, starting with the United Nations Development Program. In addition, she introduced us to Gregory Milne of the Clinton Foundation who offered advice on speaking with NGOs. Beyond that, she introduced many other organizations that provided invaluable information.

Aside from networking, Mrs. Dean was able to guide and refine our project pitches and advise us on how to speak with different organizations. Before important meetings, a chat with Mrs. Dean helped us highlight what was most important as well as clue us in on what the organization was looking to do. Not only did this help us practice our pitch, but it focused our words and gave us confidence when speaking with other organizations.

United Nations Development Program

Mrs. Dean connected us with Garry Conille of the MDG Support/Poverty Group / Bureau for Development Policy at the UNDP. We met with Mr. Conille and his team at the UNDP in New York City to discuss funding options, policies, and possibilities for collaboration. At the time, the organizations we had spoken with were concerned about callers' honesty - that is, lying about their skills in order to get a job. While this ended up being false, Mr. Conille offered funding for an intermediary interview company that would validate the skills of callers. Unfortunately, we never received contractual agreements for such a program and our financial situation did not allow us to fund it ourselves. As mentioned, call data showed a high bias toward legitimate statements given the conservative nature of skill listing.

Digicel Haiti

Clearly one of the most critical partnerships was that with Digicel Haiti. Our initial call with Digicel Haiti's Head of Product Development, David Sharpe, was productive and encouraging. Mr. Sharpe told us he liked the project and wanted to help in any way he could. We spent three hours discussing how to make Konbit a reality given our budget, aggressive timeline, and Digicel's capabilities. At first, it was required that phone calls originate from our server in Digicel's rackspace in order to make the calls freely. As such we developed and tested a system that would allow callers to queue themselves and our system would call them back when a

channel opened up. As our meetings went on, this requirement changed and we were now allowed to make free phone calls directly.

Our interactions with Mr. Sharpe helped shape the project as well as make the project possible. We worked directly with many members of the Digicel Haiti Team to install our rackspace, diagnose and test the system, and credit our callers with gourdes. We can't thank Digicel Haiti enough for efforts to help Konbit succeed.

ECONOMIC

Konbit required free phone calls, a server, a GSM modem, a T1 card, shipping and customs to Haiti, rackspace in Haiti, free text messages, and translation services should the service not receive enough volunteers for timely translations. The server was donated by Frank Moss, former director of the Media Lab, which was very gracious but only one piece of the puzzle. As such, we applied to several challenges in hopes of earning funding - as luck would have it, Konbit won top prize at the MIT IDEAS competition. With the \$8,000 from this challenge, we were able to buy the modem and T1 card as well as pay for shipping to Haiti (over \$800).

Item	Cost / Provider
SMS Short Code	Digicel-donated
Phone calls	Digicel-donated
Rack space in Haiti	Digicel-donated
Rack server	Donated by Frank Moss, former Director of MIT Media Lab
GSM Modem	Self-purchased
T1 Card	Self-purchased
Google App Engine Quota	Google-donated
Translation services	\$5,000 to 1,000 jobs / Haiti
Customs, shipping, calling cards for participants, etc.	\$2,000 to various
Public Service Announcements via radio, representative on ground for interviews	\$1,500 to CECOSIDA

Evaluation

STUDIES CONDUCTED

Konbit was first tested in a beta test in Miami, Florida with the University of Miami on a 30 person population similar to the target in Port-au-Prince, Haiti. Used primarily for reviewing and improving the system, the data from this test is stored but not currently used for any purpose. Upon the success of this test, a second study was conducted with just over 10,000 participants in Port-au-Prince, Haiti. The data from this test is currently used in the Konbit Search website.

TIERED SUCCESS MEASURES

Given the large scope of Konbit, and in order to effectively review its successes and failures, it is necessary to use a tiered success measures. These measures act as success milestones:

- Did the system function technically?
- Do Haitian nationals use the system?
- Are employers interested in the data we gather?
- Is the search interface with voice messages useful to employers?
- Are employers interested in hiring local labor?
- Does the environment support the ability for our data to get callers jobs?

The next section will discuss the beta test and first trial in Haiti using these measures as discussion points.

BETA TEST, MIAMI FLORIDA, 30 PEOPLE

Once the basic Asterisk call application was finished, and after carefully crafting the Konbit script based on the feedback from the UNDP, Clinton Foundation, University of Miami, Konbit for Haiti, and KozeAyiti, a beta test was conducted with the help of Maggie Austin of Konbit for Haiti, KozeAyiti, and the University of Miami. We offered to fly to Miami to run the trial ourselves, but Mrs. Austin volunteered her community members to help since they speak Creole

and can interface well with the Haitian Diaspora there. To help, we created a guide for using the system and how to have participants use the system.

Scheduled to begin in August, 2010, the trial was delayed by several weeks as Konbit for Haiti attempted to schedule time to run it, but allowed time for Marli Lalanne to give us feedback on new skill categories that should be added for the future calls, including sewing, babysitting, and laundry. Her suggestions come from first-hand knowledge of Haiti and the skills that often exist there, especially among low-skilled workers.

The tests worked like this: each caller was briefly introduced to Konbit in a casual setting within the community center in Miami, using a pre-written introduction we wrote. Next, the caller was given a mobile phone and asked to call the Konbit number. The Konbit script ran as expected, and callers answered the questions as expected. Once the call was concluded, it was explained that the call information will be used to make the system better before it is deployed in Haiti. There was no indication that this trial data would help this initial set of callers obtain work.

Data from this trial indicated that some callers had trouble understanding what to say, that many callers did not want to use their name, and that many callers had surprisingly deep answers to broad questions. Some messages would contain audio that had the community member helper explaining when to speak: “Yes, speak now ... go ahead.” Fortunately, there were limited responses like this. We attribute this to unfamiliarity with phone tree systems for many immigrant workers - what seems like an obvious system to U.S. citizens is still new and strange for many immigrants that do not have a close relationship with technology. The number of callers that left their name blank was surprising, but in comparison to the actual trial conducted in Haiti, this seemed to be a larger issue in the beta trial only. This may be in part due to the explanation that this was a trial of the system, providing less motivation to be forthright with information that may benefit them. Very few calls in the trial in Haiti suffered from this issue. Lastly, we were pleasantly surprised by the kinds of answers we received:

QUESTION

“If you have experience with leadership, for example, managing teams, organizing events, or running a business, or any similar experiences, press 1. If you haven't, press 2.”

ANSWER

“I'm a HIV health coordinator. I'm a graduate nurse. As I was saying, I'm a health coordinator to give people tests, counsel and then organize medicine for people sick with HIV.”

Instead of asking about medical training or HIV experience, a unique question about leadership prompted this caller to provide a wealth of information as she saw fit: we learn that she has experience with HIV treatment, has coordinator experience, was in graduate school and was a nurse, and has counseling experience. This paints a unique picture of this person for employers to view. At this point in the call, we have already asked about first-aid and this caller mentioned less information in that answer than in this one. This could of course be due to becoming more

comfortable speaking with the system, and recalling more skills that could be useful, but it also relates how this person views themselves - as a leader, that they have leadership skills, and can organize well. Rather than focusing on job history, this question focuses on experiences as a leader and resulted in very useful information.

The beta test led us to make several changes to Konbit: narrator voice, simplification of questions, a more complete introduction, and a training question. As noted earlier, the narrator voice was previously too formal create an atmosphere of trust and confidentiality, and thus we set out to find a new narrator to read the Konbit script. This was also necessary in order to re-record the introduction and conclusion to provide more information. The introduction needed to include information about how long the call would take, that it should be conducted in a quiet place, and that there would be Digicel credit given for the call (explained shortly). Next, we removed questions that asked about a “primary skill,” as this was problematic from the start. Prof. DeGraff informed us early on that a primary skill in Haiti was a foreign concept and difficult to translate, as skills are more fluid than in other countries. For each category, our beta test script asked if that category was their primary field, for example, “Would you consider construction to be your primary area of expertise?” This question was removed completely given that it was culturally irrelevant and added unnecessary complexity. The introduction and conclusion included more detailed information about what callers could expect, including a statement that in no way does this call guarantee them a job, but may help. This was important to set up expectations and provide false hope to an already chaotic scenario.

OFFICIAL LAUNCH IN PORT-AU-PRINCE, 10,000 CALLERS

As successful as the beta launch was, deploying at a large scale in a foreign country contained a new set of challenges. Even during the beta trial, we were saturating our communication channels to find contacts on the ground in Haiti to help us deploy the system. Our agreement with Digicel specified that we were to have, at a maximum, 3,000 callers. Feedback from advisors and organizations were either skeptical that anyone would call in, or were worried that too many people would call in immediately. To graduate from the beta, we had several tasks to complete.

The Java / Asterisk service responsible for call handling did not include any functionality to handle call queuing, SMS message feedback, unit tests, abuse checks, or integrity tests. The queue functionality was substantially difficult given that the process was completely multi-threaded - debugging a multi-threaded application consisting of 30-35 threads is no trivial task. Since the queue functionality was reported in detail in previous chapters, there is no need to describe it here, though it was important make sure SMS messages were not sent outside normal waking hours in Haiti. Suffice to say, this functionality was built within two months in an attempt to get to the trial off the ground as quickly as possible.

First, Konbit needed to let callers know if they were queued, when a reserved spot opens up, and when the system is completely saturated. We used Kannel, a robust framework for handling SMS

services on a vast array of traditional phone networks. Obviously, these SMS messages needed to be in Creole and extremely simple to allow those that are illiterate to find someone to explain the message to them, or to use their limited reading vocabulary to decode the message. Once the messages were written, our partners at Konbit for Haiti and the University of Miami translated them into Creole. Lastly, there was a message needed to warn callers of abuse - intentional or not. It was expected that people might call in several times in an attempt to improve their chances of getting work. At the same time, phone sharing in Haiti is not unusual (19, DeMaagd 2008), so the service needed to support that functionality in addition to checking for abuse. The abuse check prevented a single phone number from calling the service more than ten times within a six hour period, allowing up to ten people to use the same for for calling in, but prevented excessive abuse that would block other callers.

Next, extensive unit tests were written to test queuing, SMS messaging, abuse checks, network saturation, and load tests. These tests proved valuable as service did not crash or fail in any way during the Port-au-Prince trial. General load balancing and testing were performed on Asterisk itself, Kannel, the Java and FastAgi server. Each process survived and was capable of handling a substantial load without failure.

Our next requirement was to re-record the script to create a more trusted atmosphere. As a recommendation by our partners at the University of Miami, Bob Lemoine graciously volunteered his time and his famous Haitian radio voice to Konbit. He has worked tirelessly as a radio announcer in Haiti, and his wonderful voice is known throughout the country. Mr. Lemoine recorded the Konbit script offsite, so we created a full script for him to read and record. After several sessions, we were able to mix and normalize the files into what ended up as a fantastic read of the script. The professionalism and care that came through Mr. Lemoine's voice is in no small part a reason for a massive increase in trustworthiness. All of these audio files were then refactored into the script, including new categories that were recommended earlier by Konbit for Haiti: sewing, babysitting, and cleaning.

In order to make Konbit a success, the Haitian population needed to be aware of its existence. Again, Mr. Lemoine volunteered to record two Public Service Announcements (PSA) that could be played over the radio in Haiti. Radio is the primary means of disseminating information in Haiti (UNDP, PIH, Red Cross 2011), and thus a radio PSA would be an effective strategy to spread awareness. We contracted CECOSIDA to pay for airtime on four of the most popular and targeted radio stations in Haiti, as well as hire a representative to go on-air and be interviewed about Konbit on our behalf.

There was no way to test whether all this preparation would be a success in Haiti. Our beta test only a small core of functionality, mostly focused on the script and the questions asked. To make matters worse, in November, the time we expected to launch Konbit, a Cholera epidemic broke out causing mass chaos. This, in addition to the political elections that were taking place at the same time, created a problematic situation in which to launch Konbit. The Red Cross contacted us to discuss the possibility of deploying a version of Konbit to aid the Cholera situation, but nothing came of the request.

We waited as long as possible for events to calm, but they never did. On December 20, 2010, we officially launched Konbit. A web-based real-time monitor of the phone calls allowed us to see how the system was performing at any moment. The radio campaigns began, Konbit was live, and we held our breath.

Given the holiday break, Aaron and I were home visiting our families, and assumed the system would take a few days to receive any calls. When we checked the system a few days after launch, we were more than surprised to see that over 400 people had called in on the first day and that we were still receiving calls. Data was pouring in, and it seemed that our radio campaign had succeeded.

Within a month, the system was still running without a hitch and we had around 1,700 complete calls - a complete call was one that finished the entire call without hanging up. We noticed a strange behavior: a single phone number would call in, provide no answers to the questions, then hang up before it was finished. Next, the number would call in several more times within a half-hour. On the last call, the caller would answer all of the questions and complete the call. Our theory is that callers were either exploring the types of questions that were asked, demonstrating the call to friends, and/or preparing answers for the official call. The Konbit server still did not buckle under the load, the queue mechanism worked perfectly (as could be seen by our web-monitor, showing non-reserved calls, queued callers, and when a reservation was used by a former caller).

Still under 3,000 callers, we paid that CECOSIDA to run the same campaign yet again to increase call numbers. A few weeks after that, a burst of calls shot our numbers up to around 7,000 callers, at which point we began to take steps to shut Konbit down as per our agreement with Digicel. Two days later, we had over 10,000 callers, and it is our belief this number would have grown exponentially had we been allowed to keep the system running.

1,000 jobs / Haiti worked hard to translate their share of the 60,000 messages we recorded, though it took much longer than our original contract specified. At this time, we upgraded the translate and search functionality and began aggressively pursuing NGOs, including meetings with OxFam, The Red Cross, and USAID, to show them the data we had collected.

In order to provide a buffer should we not succeed in finding work for our callers, we paid Digicel a lump sum to credit the first 3,000 callers with a 15 Haitian gourde credit for talk time on Digicel's network. In this way, we hoped to at least give something back to the community for their trust in us.

As a result, we handily succeeded in tiers one, two, and three.

DATA FROM THE PORT-AU-PRINCE TRIAL

In order to demonstrate how Haitian callers responded to Konbit, it is useful to detail a series of responses to questions asked during the call. The following is the Konbit script with answers from actual callers that highlight how they responded to the questions and if they understood what was happening. Names are not given to keep data anonymous.

All translations are written here as they were translated by our workers. Grammatical and spelling errors are the result of translating to english - we also have the original Creole text associated with each message. For clarity, it is assumed that the reader does not speak Creole, and thus a grammatically incorrect English version is a superior example.

Type	Text read by Konbit	Example data from calls (Translations are not perfect)
Introduction	Hello and welcome to Konbit. Our goal is to help you get a job. This phone call takes about 5 to 10 minutes and costs only 1 gourde thanks to Digicel. We're going to ask you simple questions about the skills you have, and we hope you will confide in us. We ask you to trust that we will keep this information safe and use it only to help you get a job. Please be honest with us and tell us as much as you can about your skills and life experiences - telling us more information helps us find the right job for you. Before we get started, please find a quiet place so we can hear you clearly. When you're ready, press any number on your phone to begin.	No voice recorded
General info	What is your name?	No voice recorded
General info	In what city or village are you located now?	I live in canapé-vert #63
General info	If you are male, press one. If you are female, press two.	No voice recorded
General info	Is this the best number to contact you?	No voice recorded
General info	Please tell us how we can best contact you, including any other phone numbers.	(Typically provided another number)

Type	Text read by Konbit	Example data from calls (Translations are not perfect)
Medicine	<p>If you've had experiences with first-aid, for example, CPR, setting a broken arm, recognizing malaria, bandaging, taking care of an ill loved one for an extended time period, or any similar experiences, press 1. If you haven't, press 2.</p>	<ul style="list-style-type: none"> • I used to work with "The body of red ribbons" a team of rescuer that make part "SERVO", Voluntary Services Haitians. After 12 of january, we had serve a lot of people lives under rubble specially in Delmas and Leogane. • I can advise people on how to prevent diseases (epidemic). I can recognize when someone gets Malaria because I'm a first-aid worker and I can give injection. • Well in the domain of health, me as a nurse i have experience in hospital like if there are people that come in the hospital if that person need a bandage like if it urgent if we look at person to see what the need the person have if it blood presure or temperature if there are a doctor here he will prescribe something for that person. • I remember there was an accident by my house it was a young guy his arm had been brok[en] i took him to the hospital and i took care of him in still his parent came. so this how i help people by that way. • I am licensed in medical imaging, tepography I do, I do I do X-ray sonography I do scanner I do all the diagnosis in medicine
Construction	<p>If you've had experiences with construction, for example, plumbing, pouring concrete, carpentry or any similar experiences, press 1. If you haven't, press 2.</p>	<ul style="list-style-type: none"> • I am somebody who comes right after an Engineer, I can build concrete, I can do construction, I am a plumber, carpenter, I can do everything in my field (construction) • In the areas of construction, I had already told me you are a contractor, I made several contracts with oganizasyons with the Haitian government also built schools, health centers build, construct pump water in dams etc ... that I made • In one word, I'm an electrician. I studied electricity in buildings at Salésien for two years, as a result I have a detailed knowledge of electricity in buildings. • I am also a scrap merchant, I can do everything that you'll need in the scrap merchant area. For the masonry, it's true that I don't have many experiences but I can work on it. • We were employees in "cash for work". We work a lot in house building as electricians, assistant plumbers...

Type	Text read by Konbit	Example data from calls (Translations are not perfect)
Language	<p>If you've had experiences with languages, for example, speaking another language and how well you speak that language, writing documents for a business, or any similar experiences, press 1. If you haven't, press 2.</p>	<ul style="list-style-type: none"> • We worked with some american medical doctors six months ago, interpreting for them when the people needed health care. And we had been given a certificate indicating that we are good at speaking English, we can prove it anytime. • I'm working with an African entrepreneur who speaks only French and English. We make investigations, we work with our teachers and I always translate interviews from Creole into French for him • We speak Spanish very well. We worked as interpreters with Spanish companies after January 12th. So, We have a lot of experience. • I had a master's degree in French foreign language that allows that I teach in universities, in French as a 2nd language language I have a strategy that allows me to teach them to speak French I can teach at all levels of French language, I had a mastery memory and heritage of which I can produce documents in French and allows the translation I can do French and Creole me give consultations when they need a document translated such a expozişyon conservation of heritage and I know research is also these languages . • I don't work yet in languages field but I speak English fluently and I can write it very good. • I usually translate to people I know, out with them, when they go do an activity to help them translate, my English I speak more familiar with English I know. took out with visiting some place to talk with them and but I will translate for I know young children learn English, so visitors do not speak Creole because of language problems. • I studied communication at Human sciences faculty. I speak English and Spanish fluently and as a reporter I used to translate texts.

Type	Text read by Konbit	Example data from calls (Translations are not perfect)
Leadership	<p>If you have experience with leadership, for example, managing teams, organizing events, or running a business, or any similar experiences, press 1. If you haven't, press 2.</p>	<ul style="list-style-type: none"> • I was head of credit in a bank, I was in a team that had four people, I was the chief for this team and I was responsible of credit in another enterprise on the market. I have two or three people on my responsibility. • As a social worker, I was training for social brigades for the Minor Protection (DCPJ). I used to animate seminar for children whose conflict with the law. I had a time as worker in INFOSEP as assistance guide for people who have HIV. Currently I am working at Fatima, as a help for women with diabetes do tension and others. • i often manage group and the committee that i have on canape- vert place, and i have a little job in aeroport area, but now, i write letter for the people of the group. • I know organizing games leagues, I am in a club, I usually teach children to sing, so The ones who have no way, I usually help them, teach them. Children under way to go to school, I usually help them. We work as a team too. • As being a sociologist, I know how to work with several groups. I used to be a coordinator "kids club" after earth- quake, I'm currently building a project to help the victims after january twelve. • I had rice project education and I work in my education projects several framing many groups working in the country do much training and I already create some firms so interpret a capacity of management • I am civil engineer and we construct many administrative and residential building. We work for the state and private. I am the PDG of a firm of construction that is called GL services, and we operate on the field since the year 2004. Then I am the president of an organization called SOREDEV which is " Solidarity of the Resources for the Development ". I am so far is the overall coordinator of this organization It is based in Haiti, we have our representation in several departments but not yet completed in all departments
Security	<p>If you have experience with security, for example, policing, guarding, or martial arts, or any similar experiences, press 1. If you haven't, press 2.</p>	<ul style="list-style-type: none"> • I am not a security guard of a company, but the security guard of a leader . I learned Tae-kwondo, jido, Hi-kido. So i have a small idea in karate. • In the areas of security, which I know to secure the carnival, and I had secured Serge Montes 2005-2006 elections would be held in the country he would go as mayor of Port au Prince and I know training from former how to manage a perimeter and on how I took my seat in the office how to supervise it • I was part of "Corps d'honneur" Led by a General. I'm also a security Agent and I went to judo school.

Type	Text read by Konbit	Example data from calls (Translations are not perfect)
Engineering	If you have experience with engineering, for example, building bridges, water pumps, or irrigation systems, press 1. If you haven't, press 2.	<ul style="list-style-type: none"> • in civil engineering, and building furniture, I am a specialist in metal roofs and I do forge build irrigation canals I made several experiments have more than 10 years experience in this area since I worked as civil • I'm an engineer and we built lots of adminitractif boat.we work in the gorvernment and we work in private.We have a file of all calification and in any moment we can put them in disposition so you can looked at them together the work that we realized.and any moment we would like to visit the yard with us,we will not have any problem.As i told you, we are PDG a film of construction that they called GL service,can we have been on the field since 2004. • I know doing plumbing, I know building house, I have a lot of experience on them. • I'm not an expert at plumbing and mechanical engineering but I can fix my own car depending the problem that it has. So, I can work in this field. • I am an engineer working in the construction of pipelines house prepare House after January 12, we still experience we make abstraction of water sources, river flows have followed asenisman course we understand that treatment.

Type	Text read by Konbit	Example data from calls (Translations are not perfect)
Counseling	If you have experience with counseling, for example, therapy, or counseling your community, or any similar experiences, press 1. If you haven't, press 2.	<ul style="list-style-type: none"> • Me, I am a nurse specialized in community health. We give advices in the sanitary domain for example in relation to the HIV/AIDS we do trainings for people in counseling, train the nurses in counseling, we also do counseling for people who need to do the HIV/AIDS test. We also give advice in the community if they do an activity, a plan. We give advice, we make meeting with them, focus group and we also do counseling for people who need counseling in the health domain. • In training I did in the welfare of the children I give advice on what they can do when they dosmektik violence victims and children who have trouble with the law I can give advice but to explain how they should behave to come to a new peèonaj within society and in the field of HIV AIDS is my responsibility Counseling That means when the person infected by HIV-AIDS and provide support emt Labor FOSREF especially counselor and social worker, you give him Counseling so that it well get his head well understood disease is what made me a 6 months working at Mt FOSREF • My experience is after January 12 that they had people who were broken and they feel humiliated and stressed out, I went to talk with them to tell them life is not complete, then I gave jokes with them, it's like that I was a PhD but it's a gift. • We always regroup us as a team, in order to be able to give advice. Sometimes in the province, we often have groups of people to talk about political ideas, we think how we can solve a problem in the community that we see no good. If there is a project we always get along to see if we can write some projects in order to make the community evolve We still hold meetings between people in the communities where we are and we always arrange us in the way to see how we can move forward. • I was part of an organization called FAED (Fondation d'Aide aux Démunis Infante), I was playing mentor, when there is a problem, they debated the topic and each person makes suggestions, and I had my always oriented in said but what is good, if you do but how it is, if you do but how it will go out. In all arranged together to ask about a single decision to do so to walk as everyone expects it should work. And I still like to advice, I have my friends when they have problems they always called me to tell me but the problem is. I still think, after I to say but how can I help them and I always find a solution. It is like a gift God has given me to always help people, mentor them.

Type	Text read by Konbit	Example data from calls (Translations are not perfect)
Transportation	If you've had experience with transportation, for example, driving cars or large trucks, driving other people around, finding your way through the city quickly, moving lots of rice, or any similar experiences, press 1. If you haven't, press 2.	<ul style="list-style-type: none"> • in the field of transport, I know how to drive if I find a company that needs a driver make transport for them like for example to transport rice and some other things I can drive trucks through, but I drive machine car, please help me. • I'm a taxi driver and ex employer of TELECO. I make transportations from jeremie to Port-au-Prince and so on. • I am a driver and a mechanic of career, I am sure common transportation in a way that is extremely difficult, Fermathe / Petionville. Then I have various experience in going to the provinces as Jacmel, the North, Miragoane. • in domain tanspo I can tell you, I have very broad coverage in this area, because in all departments of the country and I was driving an official car and I also ground sheet and a deputy in tanspo I can tell you , I have a very large coverage in this area, because in all departments of the country and I was driving an official car and I also ground sheet and a deputy.....
Repair	If you've had experience with repair, for example, fixing cars, sinks, water pumps, or any similar experiences, press 1. If you haven't, press 2.	<ul style="list-style-type: none"> • While in the repair of vehicles, such as water pumps, I have a good knowledge of plumbing and I repairvehicles ... such as technical failures. I, as owner of the vehicle, I faced technical failures, I make sure to fix them myself. I am not an expert in mechanics, but I can do many things mechanical. • I am in the rapair field, for example when a vehicle has some carburator problem I can fix it by cleaning it. Overall I am a first year student in Mechanics I can fix water pump and any other thing related to mechanics I can do it. • I have lot of experience because i worked in Duval Homes for five years,i fix generator and truck motor,I know generator well.
Babysitting	If you've had experiences with babysitting, for example, taking care of children, helping sick children, having children of your own, or any similar experiences, press 1. If you haven't, press 2.	Responses not yet translated
Laundry	If you've had experiences with laundry, for example, cleaning clothes, cleaning suits, dry cleaning, ironing, special fabrics, or any similar experiences, press 1. If you haven't, press 2.	<ul style="list-style-type: none"> • I can do the laundry and clean offices. • i can do is nursing and do laundry in hospital

Type	Text read by Konbit	Example data from calls (Translations are not perfect)
Sewing	If you've had experiences with sewing, for example, repairing clothes, creating clothes, fixing suits, knitting, creating blankets, or any similar experiences. press 1. If you haven't, press 2.	Responses not yet translated
Cleaning	If you've had experience with cleaning, for example, cleaning offices, rugs, wood, special materials, or any similar experiences, press 1. If you haven't, press 2.	<ul style="list-style-type: none"> • Like if i would fine a job like cleaning rice i will do it because in this life there're not big jobs or small jobs,i can clean up the rice.
General info	If you can work at night, press 1, if you can't, press 2.	No voice recorded
General info	If you can work during the day, press 1, if you can't, press 2.	No voice recorded
General info	If you are comfortable working outside, press 1, if you aren't, press 2.	No voice recorded
Other skills	Finally, please tell us about any other skills we might have missed.	
Training	Now that we have your existing skills please tell us about any skills you would like to learn if training were to become available. For example, you might wish to learn about farming techniques or how to repair water pumps.	<ul style="list-style-type: none"> • I'd like to learn the techniques in agriculture to plant because I come from a rural community. • No, I don't want to learn this stuff. I would rather attend seminars so that I can improve my knowledge. • I'd like to learn management science and accounting,but i can be to learn the technical of plantation. • I'm an electrician,i'm in my second year of economic science.I would like to learn plumber. • I would like to improve my knowledge in data processing, project management and elaboration. • agriculture, I'd like to learn how to plant trees because we have lost all of the trees in the country. • Knowledge is never too much. So, once you promise to help me I'm ready to learn. • would like to learn repairing computer as if you could tell when the computer has a problem I can fix it dismantling it, so I do what I want in it.

Type	Text read by Konbit	Example data from calls (Translations are not perfect)
Conclusion	Thank you very much for your time and trust. While we can't guarantee that you will get a job, we will do our best to help organizations find you and employ you. Please be patient, as we hope to start finding jobs for people soon. Thank you again.	No voice recorded

VALUE OF DATA COLLECTED

The data clearly shows valuable skills, from well-trained to self-taught workers. It would be difficult to argue that the value of construction workers, plumbers, electricians, etc. is low even in the most developed nations. In Haiti, the value of these skills is significantly higher due to the mass destruction of the earthquake, not to mention the non-robust systems already present there. This kind of system shines a light where there would otherwise be a void of information, and specifically on the callers, focusing on fundamental skills needed for reconstruction efforts and disaster response. Looking at the data, we have 10,000 callers with extremely useful skills, disparate skill sets, and a powerful search interface for finding them.

Despite this, we are having a difficult time finding employers for these types of skills, despite our talks with Red Cross, OxFam, Partners-in-Health, and USAID, even considering the long-term benefits of local hiring (Bartik 1993).

Does this invalidate the premise of the thesis? No.

While it is tempting to use employer interest to validate the thesis, it would be a premature evaluation given the time scale of a fully-deployed, production system. It may take months or years for the system to be fully utilized by employers, but that is the next phase of the battle. A more useful evaluation (not to mention a harder obstacle to overcome) focuses on what was required for thoughtful, prepared responses from thousands of Haitians.

First, callers typically called in three to five times before answering questions and completing the call. This implies that callers were taking time to understand the questions and call back with thoughtful answers, and that they spent time preparing and evaluating how to respond. Callers spent a significant amount of time to do this many, many times, in a country where power and money are scarce. As if that were not enough, trust in Haiti is a major hurdle to overcome, as is clear from the socio-political climate (noted in the Challenges section), and yet 10,000 callers

completed a call with thoughtful responses. It's simply too early to evaluate this system from the employer perspective, but that has no impact on the fact that the system was largely used by our target population.

Second, the success measures are broken down into several tiers to accommodate the sheer scope and unpredictability of deploying a system in Haiti. As noted, we succeeded in three of five of these tiers.

Third, with simple metrics, we can show how many skills the average person has and the spread, speaking to the substance of their responses. That is, callers did not reply "no" to every question, but actively used the system as desired.

Third, we have a unique set of data containing thousands of valuable skills, featuring workers that can be vetted and employed immediately. Most are universal skills that are always useful, such as plumbing, concrete pouring, and electrical wiring.

Fourth, the data sheds light on potentially unknown skills in Haiti. For example, a large percentage of callers speak Spanish in addition to Creole. It is likely that without Konbit's data, this information would be hard to verify or discover. Even without proper Natural Language Processing techniques and deep data-mining, it is readily clear that the data uncovers hidden information about Haiti (a key conjecture made in this thesis).

Fifth, most callers specified the type of work they would like training in. Thus, if a company is interested in finding a series of workers that have some experience with IT and would like proper training, Konbit can show them this information with a simple search for "IT Training." Training is undoubtedly a critical component of helping a country become self-reliant, and we have an index of 10,000 people and what they would like to receive training in. Several companies have already expressed interest in looking for people to train, but moving from interest to actual training is a long process that takes months of emailing and meetings to complete.

Though the ultimate goal was and continues to be finding work for our callers, our evaluation is much more akin to production. As noted, the time scale of this project simply cannot be predicted or managed, and it may take a year for this system to be utilized to its fullest extent. It is not a test done in a closed system on a small group of people that can be completely verified for success in an academic study. The data collected is likely valuable and unique, and that in itself is a success.

In other words, it is not the value of the work that is questionable, but the way it is presented to employers. We are just now beginning to determine what is and is successful when presenting the data to employers. It is our belief that it is difficult to grasp the extent of data we have collected without a more compelling visualization that instantly conveys to employers how much data is present. Moving forward with this and other efforts as defined in Future Work, we expect to find work for our callers in the future.

USEFULNESS OF THE SEARCH INTERFACE

Our search interface provides a way to search by custom data-mined categories, by high-level human-assigned tags, and by a direct search box. The results contain any text matches or category matches, with matching terms highlighted. Original audio messages that correspond to the matched text are also available for further analysis by employers. In this way, we provide most of the standard functionality of a resumé search found on other sites and augment this functionality with audio voice messages. Further, the resúmes shown may look normal, but it is important to remember that a single phone call was the source of said resumé and the apparent simplicity of the final presentation should not undermine the difficult process its creation required.

User feedback on the search interface has been difficult to obtain in the two months following the collection and translation of that data (only usable as of March, 2011). Though we have spoken with several large employers, we often run into the roadblock that they do not explicitly hire people with skill sets like our callers (construction, repair), and often focus on larger goals such as infrastructure design. We have begun to pursue smaller organizations that may be more interested in the skills of our callers. That said, those that have tested our system (Red Cross, OxFam, USAID, etc.) have mentioned that it is very simple and useful, and that the audio samples definitely provide a richer representation (Chalfonte 1991, Connell 2001). Anecdotally, it seems the interface is generally useful, but that there maybe be other non-technical hurdles to overcome.

FEASIBILITY CONCERNS

Despite the success we achieved gathering a unique and complex set of data,

We have four major concerns with Konbit:

1. Do NGOs and GOs want to hire local labor?
2. Will our questions elicit the right kind of data?
3. Do callers possess the necessary skills to be employed?
4. Are there enough jobs for callers?

Regardless of the answers to these questions, we will learn a significant amount about the project and the skill sets in Haiti. Further, if NGOs are not interested in hiring local labor, but our data shows numerous potential candidates (who most likely know the terrain and culture of their country better than foreigners), we can approach media outlets to raise awareness about their

unwillingness to cooperate. This may expose NGOs that exploit areas like Haiti for their own gain.

If our questions have not elicited the right kind of data, the data we do elicit will tell us more about why. Additionally, we can begin to have conversations with Haitians and leaders about how to improve the call: once we have data to work with, we can begin to critique it.

Callers may not be skilled enough for the jobs present. In this case, we can pursue training options as we currently ask about training preferences as well. We have already been contacted by an architect in California that is looking for labor to train in Haiti for building an orphanage.

If there are not enough jobs, then perhaps we can use the data as a way to advertise the strengths and weaknesses of Haiti's labor force to entice outside investors to better understand the business landscape. We can only hope that this would create additional jobs, though it is clearly speculation at this point.

FUTURE WORK

It is difficult to imagine that out of 10,000 callers, none of them will find work. Our current and future work consists of seeking out and speaking with employers of all sizes and shapes to find the best fit. We predict that, should one employer find the system, others will quickly follow. As mentioned, our next steps are to produce a compelling visualization of the skills and their locations in Port-au-Prince as a way to spark interest and provide a useful way to summarize the data to potential employers. Following this, we hope to find the first employer willing to hire using Konbit.

The future uses of Konbit are interesting in that they span from first-world countries to developing countries. Taking over a year of work to launch the first version of Konbit leaves many revisions undone, but not far from realization.

CENSUS OF LABOR IN HAITI

The system provides broad economic value for creating a location-based census of labor capacity. Perhaps the fastest next step is to create this census of the skills we have collected and provide a represent Haiti's capabilities rather than its struggles. A census of labor would provide external investors a critical insight into the country's abilities, allowing them to more seriously consider developing businesses there. This census is currently in a nascent stage, using simplistic topic modeling to extract feature sets and commonalities. This data is then visualized in a striking manner to attract attention to the positive assets in Haiti, as opposed to focusing so heavily on what has become the (somewhat misleading) classic image of an impoverished and incapable country.

TRANSITION TO GOVERNMENT-MANAGED EMPLOYMENT AND OWNERSHIP

Assuming employers are interested in using Konbit, our long-term goal is to transition from an academic project into a Haitian-owned, private company responsible for job placement at a massive scale. We have seen this recently in Haiti - small services taken over by the Haitian government as official institutions - and it is our hope that Konbit could become one of these services. We are currently a finalist in the INDEX: awards, a competition that could earn us 100,000 euros for Konbit. This money could then be given to the entity that takes over Konbit to help pay for translation and maintenance. Because it was designed to be easily deployable and malleable, Konbit should be relatively easy to maintain.

ADDITIONAL FINANCE OPTIONS

Konbit is cheap to run, if not free. Running the search and translation sites is a small hosting fee per month that we will continue to pay for as long as necessary, the last translations will be covered by our current grants and gifts (and the translation site is of course open to the public for crowd-sourced efforts, should the project gain momentum among the Haitian Diaspora), and employers are responsible for funding their own projects, using Konbit as a way to find employees. Still, as mentioned, the INDEX: awards would grant us 100,000 euros to continue the project. As such, the current 10,000 callers can be supported and maintained for very little. To ensure consistency, the 100,000 euros could hire someone to keep track of employers to prevent employers from not paying employees.

A final option is to charge a small percentage for each employee that is hired or to charge a monthly fee for access to the Konbit search system. This has been asked of us each time we presented the system to NGOs and employers, and the idea that search is free surprises them. This indicates an expectation and potential willingness to pay for the service.

Further, there has been interest among the sponsors of the MIT Media Lab in owning and funding Konbit. Though these promises may not carry much weight, they are nonetheless possible options for the future of the project.

Regardless, the search and translation interfaces will continue to run.

ASYNCHRONOUS PRE-INTERVIEW VIA VOICE/VIDEO FOR DEVELOPED WORLD

As expected, the voice messages left by callers are powerful and telling. We believe this rich set of information could be useful in countries like the United States, as well, but in a different way. Small businesses could make use of Konbit to conduct “pre-interviews,” whereby they ask a few questions via video or audio, and potential candidates can reply to these questions using video or audio. This could help get a sense of personality, culture, confidence - all of the attributes Konbit attempts to represent with voice messages. Either before or after resumés, this pre-interview process could help match employers and employees better without requiring a traditional interview in order to determine a cultural fit.

Additionally, we can attempt to extract a ballpark expertise in several areas, as well as allow employers to asynchronously pass back questions to potential employers. This allows employers to ask a question via our web interface, then our system calls the potential employee and plays the question for them, allowing them to respond. We then pass this answer back to the employer in the context with the person’s story. This allows us to organically grow a person’s story as they are questioned.

THE KONBIT SERVER: LEFT FOR OTHERS TO USE

The Konbit server still sits in the rackspace at Digicel Haiti, connected to their E1 circuit. It has a full complement of software packages ready to use, meaning other developers can easily connect to and use the machine we spent eight months setting up in Haiti. We encourage other developers and organizations to consider how they might make use of a highly-capable Linux server with a strong internet and telephone connection.

A NEW SCRIPT

Mentioned earlier, our second version of the Konbit script would reduce the need for as much translation by relying on yes/no questions to determine expertise. This script follows a format where open-ended questions are only asked about life experiences in general that might have led to useful skills, and categorical areas (e.g. car repair) follow this format:

1. Can you change a tire?
2. Can you repair a broken radiator?
3. Can you repair an intake manifold?
4. Can you repair an entire engine?

These questions are all answered via voice, saying either “yes” or “no,” and allow us to get a sense of expertise more quickly. Of course, it is easy to be dishonest about these questions, but those that lie and are called upon for a job they cannot do will receive negative marks in our search engine, and eventually word can spread that lying is ineffective.

ORGANIC PROFILE AUGMENTATION

By inferring which skills are often associated together, we can help people determine additional skills they may have forgotten to mention. If we notice that callers that say they can pour concrete often report that they can put up dry-wall, we can message those that have “pouring concrete” on their profile and ask: “Can you put up dry-wall?” Responding yes or no to this question allows us to build out the resumé in an intelligent way without requiring constant attention from the worker.

FUNDING, PRESS, & AWARDS

Konbit received funding from several sources:

- Konbit won the grand prize at the MIT IDEAS competition
- A donation from The Freygh Foundation
- A donation from General Atlantic
- A donation from Frank Moss, former MIT Media Lab Director

Additionally, Konbit was featured in the press:

- MIT News 2011 Cisco
- ReadWriteWeb
- Huffington Post
- Mobile Active - Lessons from Haiti
- Center for Future Civic Media interview
- Slice of MIT
- Public Radio International's (BBC+NPR) The World
- Post-launch article on ReadWriteWeb
- MIT Global Challenge Notebook
- US/ICOMOS
- Miami Herald
- JustMeans
- MIT IDEAS Competition Winner
- MIT Technology Review
- Fast Company Story 2
- Fast Company Story 1
- MIT News Story 2
- MIT News Story 1

CONCLUSION

Based on the tiered success measures proposed earlier, Konbit has succeeded in much of its mission, but it remains to be seen if Konbit's callers will find work. The operation of the system and data collected was favorably received by the employers surveyed. However, finding employers with the necessary combination of requiring local labor and a willingness to change their employment practices is going to be too lengthy a task to be within scope of this thesis. Konbit's collected data is valuable, unique, reveals information where there would otherwise be none, and is useful in several ways using metrics and data-mining. The next phase is dedicated to doing what it takes to hold our promise to the Haitian callers and understanding how to engage employers properly to use this valuable data.

Konbit makes it possible for illiterate and disconnected workers to create an in-depth resumé with a simple phone call. Acting as a cultural bridge, Konbit connects the underserved in developing nations with those with money and modern expectations. Further, Konbit creates technological bridge where the input to the system (phone-based stories) is custom-fit for the population of areas like Haiti, and the output is custom-fit for professional employers (web-based resúmes).

The transformation of the output to input lowers the threshold for disconnected workers to be found, and breaks down an intricate process into a structured conversation.

Three questions were asked:

1. Can we help the excessively disconnected tell their story to foreign employers that expect resúmes and interviews?
2. Can we provide a way for illiterate people to use their voice to explain their life experiences, and translate this information into a medium that employers understand?
3. Can we construct an a rich CV for voiceless, that isn't based on job history, but is based on life experiences?

We contend that we have answered the first and section questions, as the data we have collected shows in-depth stories and skills that, when presented as an auto-generated resumé, tell a story in a format that is comfortable for employers.

The last question, is only partially answered. Many callers spoke about job history, which indicates that they too have an expectation that job history is important. Still, embellishments on the job titles are often long and involved referring to life experiences. Further, this amount of data would have been extremely difficult to text into the system. Additionally, the voice messages shown on each resumé provide context, emotion, and rich data that cannot come through text alone.

Konbit creates a compelling portraiture of an individual and offers the depth of voice, creating a cogent persona for those that would otherwise not be able to create a resumé. This humanizes the employment process and creates access for the most disconnected.

Lastly, the platform deployed in Haiti can be used and expanded by others hoping to start projects in that country, and in other countries around the world. Konbit joins a movement of low-cost, culturally-sensitive digital humanitarian efforts, helping an area that is affected by illiteracy, poor training, or cultural gaps between workers and employers.

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APPENDIX

DIGICEL MEMORANDUM OF UNDERSTANDING

**Memorandum of Understanding on the
Konbit Initiative in Haiti:**

This Memorandum of Understanding is hereby made this 2nd day of September, 2010 between:

Unigestion S.A., DBA Digicel Haiti
#151, angle Ave Jean Paul II
& Impasse Duverger
Port-au-Prince, Haiti
PO BOX 15516

Greg Elliott and Aaron Zinman
Graduate Students,
MIT Media lab
Cambridge
Mass., USA

1. The above named companies shall work towards developing the KONBIT service which catalogs job skills of the population via SMS and IVR.
2. This project is based upon two presentations from Messrs. Elliott and Zinman, attached hereto and incorporated by reference: (a) Konbit – Digicel - briefs and requests; and (b) Konbit-Trial-Proposed Digicel.
3. The following are the fundamental dimensions to this technical trial:
 - (a) 3000 person trial
 - (b) \$400 for first month for data center usage (1 E1, rack space), \$800 for additional months (if they are needed)
 - (c) Free incoming calls to E1
 - (d) Free outgoing texts (3 per person expected, 6 person maximum)
 - (e) 512kilobytes/sec data
 - (f) Separate dedicated IP + ethernet plug (<64KB/sec) for remotely monitoring the system.
4. This trial is to last for thirty days.
5. Digicel will be in possession of a server provided by Greg Elliott and Aaron Zinman for the duration of the trial. Digicel will have responsibility for the server until the end of the trial, and responsibility to ship it back at the expense of Greg Elliott and Aaron Zinman to whatever location they specify.

6. Messrs. Elliott and Zinman agree to: (a) reimburse Digicel for the duty paid to clear the server from Haitian customs; and (b) promote at international functions a positive image of Digicel Haiti.

7. This agreement may be amended by mutual consent of both companies.

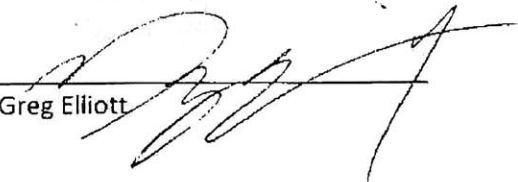
8. This MOU shall be in effect until either party withdraws from the MOU one month after providing written notice of intent to withdraw.

Signed by:

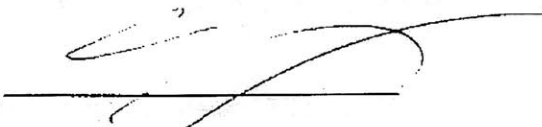


Maarten Boute, CEO

Unigestion Holding S.A., DBA Digicel Haiti



Greg Elliott



Aaron Zinman

1,000 JOBS HAITI CONTRACT

1000 Jobs/Haiti agreement with MIT Media Lab

Translation for Konbit project

This Agreement made this **28th** day of **October**, 2010 by and between 1000 Jobs/Haiti, an American 501(c)(3) organization located at 316 West Main Road Little Compton, RI, herein represented by its undersigned officers and MIT Media Lab, located at **75 Amhearst St, Cambridge, MA 02139**, herein represented by its undersigned officers.

WITNESSETH

NOW THEREFORE, the parties for the mutual benefits conferred upon each other herein, the receipt and adequacy of which are acknowledged, agree that:

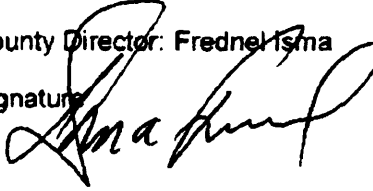
1. 1000 Jobs/Haiti agrees to, using the website provided by MIT Media Lab, transcribe the Creole audio recordings of approximately 3,000 persons and also provide a written English translation. It is estimated that audio recordings of each person will total 4-6 minutes long, where by each sub-recording of a person is estimated to be in the range of 3 seconds to 2 minutes.
2. It is anticipated that this project will be completed in two (2) months, not to exceed three (3) months from date when audio files are first provided to 1000 Jobs/Haiti
3. MIT Media Lab agrees to pay **46 cents** for each minute of audio transcribed and translated. Payment will be made via **check within 30 days of invoice**.
4. 1000 Jobs/Haiti is responsible for the completion of the online tasks assigned by the client. This includes the quality control of translation, transcription, and any other tasks linked to the present contract upon which MIT Media Lab and 1000 Jobs/Haiti agree.
5. MIT Media Lab is mainly responsible for the technical aspects of the tasks to be completed. This includes the quality of the audio files, the instructions for completion of tasks and the maintenance of the platform (bugs, errors, etc.) Also, MIT Media Lab is responsible for the payment of the tasks completed at the rate agreed on in this contract.
6. This Agreement may be amended or renewed only by a writing executed by the parties hereto.
7. This Agreement shall be interpreted, and the rights and liabilities of the parties hereto determined, in accordance with the law, and in the courts, of the Commonwealth of Massachusetts.

Executed on the date first written above.

1000 Jobs/Haiti

County Director: Frednel Isma

Signature

 11/03/2010

Asst. County Director: Mitchell Boutin


Signature

 11/03/2010

MIT Media Lab


Research assistant: Greg Elliott

Signature

 11/1/10

Research assistant: Aaron Zinman

Signature

 11/1/10

BETA TRIAL IN MIAMI INSTRUCTIONS FOR AIDS



KONBIT MIT TRIAL I

June 25, 2010 @ Konbit for Haiti, Miami

ABOUT THE MIT PROJECT, KONBIT (READ TO CALLERS)

MIT students have created a system that will help organizations in Haiti find jobs for Haitian nationals. They are testing this system here at Konbit for Haiti.

Konbit helps organizations find local labor instead of relying on their foreign employees. To be found, Haitian nationals (literate or not) call our automated service and we help them record their skills as compelling, story-like messages.

Here's how it works: a Haitian national calls our service for free. Our automated system asks them about the skills they have and our system records all of their answers to the questions. We then work with the diaspora and organizations like SEIU to translate and transcribe those messages from Creole into English text. This allows NGO's like CHF International to search for skills they need and we tell them which Haitians have those skills.

Our goal is for anyone, literate or not, to access the system and list their skills. We want to provide access to those that currently have no way to find work, and to evenly distribute the jobs that are available. Eventually, we hope that the Haitian government will be able to use this same system.

Konbit for Haiti may want to use this information to help you find work as well.

QUESTIONS YOU MIGHT BE ASKED

Q: What's going to happen with the data I provide?

A: Data is not made public and will only be used to evaluate the system and for potential employers in Florida under the direction Konbit for Haiti in Miami.

Q: How long is this going to take?

A: The phone call will take about 7-10 minutes, and the follow-up survey should take only a few minutes.

Q: How is this going to help?

A: We need to look at how people answer the questions, if we are asking the right questions, and get YOUR feedback on the system. We've built this to help your friends and family in Port au Prince and beyond, and your data will help us make this system better and get jobs for those still in Haiti. Simply by making this phone call and answering some questions, you may be helping thousands in Haiti find work.

HOW TO CONTACT US

Our names are Greg Elliott and Aaron Zinman, we are students at MIT creating this free project to help Haitians get jobs. Feel free to email us at konbit@media.mit.edu, call us at 617.715.4381 if you have any suggestions or feedback.

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