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Erica Hagen

Mapping Change
Community Information Empowerment in Kibera

Innovations Case Narrative:
Map Kibera

Map Kibera was initiated in response to the lack of available map data and other public, open, and shared information about one of the world's most-known slums: Kibera, in Nairobi, Kenya. Other parts of Nairobi were well documented by online and paper maps, but the city's most densely populated parts—the informal settlements—remained invisible. Mikel Maron and I started the project in 2009; in 2010 we founded GroundTruth Initiative to support this and other future projects. Our basic goal was to alter the existing local information dynamic by helping residents to amplify their views using increasingly accessible new technologies.

Today Map Kibera is a community information project that includes ongoing digital mapping, the Voice of Kibera community news website, and the Kibera News Network video journalism project. The first digital map of Kibera is now available to everyone through OpenStreetMap. It forms the base of the Voice of Kibera website, where residents can post stories and information via SMS and web form, and they are then geo-located on the map. A team of young people covers events in Kibera by using handheld video cameras; they edit the video themselves and post it on YouTube. Community involvement includes drawing paper maps, public participatory GIS sessions, and work with local organizations on key community issues. Approximately 30 Kibera youth now form the core membership of the Map Kibera Trust, and our programming has expanded to train people in Mathare, another Nairobi slum.

Kibera was not actually unmapped—it was in many ways the most visible slum on earth. The problem was that none of the existing maps were shared with the public or used by Kibera's residents. Kibera is saturated with international NGOs, community-based organizations, and faith-based groups. It is common to see for-

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Erica Hagen is a specialist on new media for development. Before founding Map Kibera and the GroundTruth Initiative, she worked in communications and project evaluation for the United Nations Population Fund, UNICEF, Concern Worldwide, and other agencies in India, Uganda, Mexico, and elsewhere. She is also a freelance writer, photographer, and videographer.

eigners there conducting surveys or academic research, and many of these researchers have also mapped parts of Kibera. However, even though this information about them influences the policies that most impact their lives, the residents do not have access to it. The studies repeatedly ask the same questions but do not share their results or have any visible impact on the community. This leaves the population disempowered and unable to use information to solve problems that are endemic to Kibera, including poverty, poor health, and the lack of public facilities for water, electricity, and sewage. Thus they cannot meaningfully join the debate about how to improve Kibera.

> We aimed to alter the existing power dynamic by shifting the information dynamicso that the residents could use localized information to influence policy and development.

Residents also complain that mainstream news sources in Kenya present only a negative picture—or no picture at all—of the place they call home. Nairobi journalists venture into Kibera only when police use tear gas or the railroads are disrupted. The nightly news that most Kenyans watch ignores the positive efforts of slum residents and news that is relevant to their lives, even though a large proportion of Nairobi's population resides in these informal settlements. Despite Kibera's "fame" on the international stage—including countless documentaries and NGO-funded media—these reports rarely reach a Kenyan audience. They also tend to focus on the shock value of open sewers and garbage pits or present a glowing account of a given NGO's contribution to Kibera. International audiences are led to believe that Kibera is a kind of hell on earth and are moved to send cash, while Nairobi's middle and upper classes tend to avoid it altogether, out of fear or disdain.

This is what Map Kibera seeks to address: the glaring omission of roughly a quarter million[1] of Nairobi's inhabitants from mass communications and from city representation and policy decisions. Map Kibera was founded on the premise that the digital age makes it possible to bypass traditional gatekeepers to information and data—or to ignore them completely, thereby allowing citizens to create and use new information systems. Because the information they possess is in fact a more accurate and relevant version of the truth than that held by outsiders,[2] this intelligent "crowd" may even help free up resources spent on expensive proprietary data collection and project evaluation for initiatives that Kiberans design and execute for their greatest benefit.

We aimed to alter the existing power dynamic by shifting the information dynamic so that the residents could use localized information to influence policy and development.

GroundTruthInitiative was then established in order to build off of the successful Map Kibera pilot by launching and advising on similar projects throughout the world, and to initiate more experiments in participatory technology and media. The GroundTruth[3] mission is to contribute to a culture in which digital storytelling, open data, and geographic information lead to greater influence and representation for marginalized communities.

A BIT OF HISTORY

Mikel Maron is a well-known specialist in digital mapping, particularly through OpenStreetMap,[4] the "free editable map of the whole world." A board member of the OpenStreetMap Foundation, he has led projects contributing data to OpenStreetMap in Palestine, India, and elsewhere. His experience with computer programming and the open-source community has involved work on technology projects within the United Nations and elsewhere, often involving digital community-building. Many in the open-source community believe in the Internet's potential to have a democratizing effect; for Mikel, increasing access to technology for the greater social good became a guiding idea.

The Map Kibera project was the outgrowth of a discussion among mapping enthusiasts in Africa, who realized Kibera was not included on OpenStreetMap, Google Maps, or other such online maps. This project was especially interesting to activists because of one central question: How can grassroots communities in developing countries participate more fully in the open-source projects meant to involve people around the globe in an egalitarian way? A small grant from Jumpstart International set off the first phase of the project. We initially anticipated spending less than two months in Kenya, training local people in mapping and editing the map online.

I came to this project rather unexpectedly, having met Mikel not long before and learned of grassroots mapping. I already had a strong interest in the potential of new media and the communications revolution to change the way development was practiced by altering the information dynamic. Having worked in communications and evaluation for several international development agencies, I could easily see that the poor had no communication channels, and therefore no influence, which often resulted in flawed, top-down development. I also had long been interested in supporting indigenous and marginalized people in creating and telling their own stories, including Tibetan activists, Mexican immigrants in the United States, and members of tribes in India. I realized that grassroots digital mapping was another way communities could lay claim to their own narratives and collect hard data to advocate for themselves. It could also form a wonderful anchor for localized reporting.

However, we were only partly prepared for the Kenyan context. I had worked briefly in Uganda but never in Kenya, and Mikel had only conducted one week-long mapping training in Nairobi.

PHASE 1: INITIAL MAPPING, OCTOBER-DECEMBER 2009

For about two months before we left for Kenya in October 2009, we made preparations: we bought equipment, connected with the technology community in Nairobi, and planned the most general outline for the trainings. In fact, we planned many details in advance, but had to change them completely when we arrived. We had to coordinate all the logistics ourselves. Mikel already knew members of Ushahidi, makers of a software tool for aggregating information.[5] They and others connected us with additional local organizations. Based on some of these early conversations, we had an inkling early on of what would become one of the most pertinent questions: What's a map good for in a place like Kibera?

After arriving on site, we first established partnerships with three key Kenyan organizations: the Social Development Network, or SODNET; Kibera Community Development Agenda or KCODA; and Carolina for Kibera, or CFK, which has ties to the University of North Carolina.[6] All three partnerships came through personal recommendations or contacts. KCODA and CFK are based in Kibera and work closely with the local community; SODNET develops information technology resources for transparency and governance. With the help of KCODA and CFK, we began by recruiting 13 young people, five women and eight men, one from each village in Kibera. They ranged in age from 19 to 34. Motivation to learn and to support community development were the most important selection criteria; some familiarity with computers was a prerequisite, but they did not need advanced experience.

After two days of training in using the GPS devices (GarmineTrex Legend HCx, consumer grade) and the editing software in the computer lab, the group spent three full weeks mapping their home villages. They went to the field to collect data, and then traveled to the SODNET offices, where computer lab space was donated, in order to upload. We asked the team to mark any "points of interest"
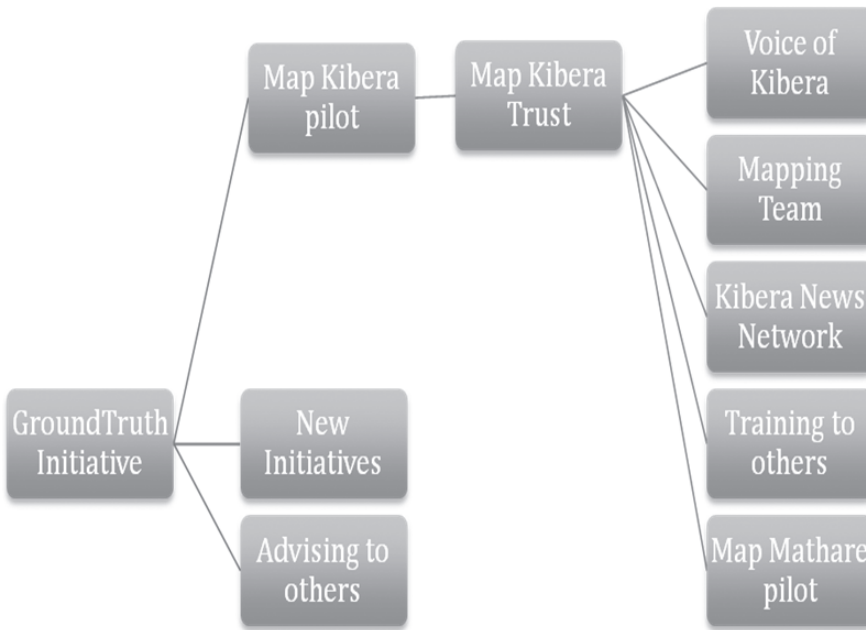
Figure 1. Organization

with the GPS and write down the name of each feature, but didn't specify what points were "of interest"—we left that to their discretion. They did not map the maze-like unnamed dirt paths, which could be added later based on satellite tracing. The GPS also recorded traces, or recordings of a route that has been taken, which were used along with satellite imagery to draw paths.[7] The points of interest they chose to collect included clinics, toilets, water points, NGO offices, electric lights, and some businesses. After one week, the team made a list of the types of features each person had collected that day, and decided together which were the most important to include on the map (see Figure 1).

Rather than create a standalone map, the project contributed data to OpenStreetMap, an ongoing open-source project. This crowd-sourced map is made by thousands of volunteers around the world: they upload their own GPS data, trace satellite photos, and scan in and trace information written on paper maps, which are bar-coded to correspond to their coordinates. The resulting data can be used in many forms under share-alike licensing that lets users remix inputs into customized results. To edit it, they used JOSM, the Java OpenStreetMap editor,[8] which can be downloaded for free and is fairly simple to use.

During the mapping, five young people from Nairobi with professional GIS skills volunteered to help the Kibera mappers both in the field and in the computer lab. Three youth based at CFK, already trained to use Flip camcorders and upload stories to YouTube, also went to the field with the mappers. The CFK youth were encouraged to film the mapped locations and interview business owners,
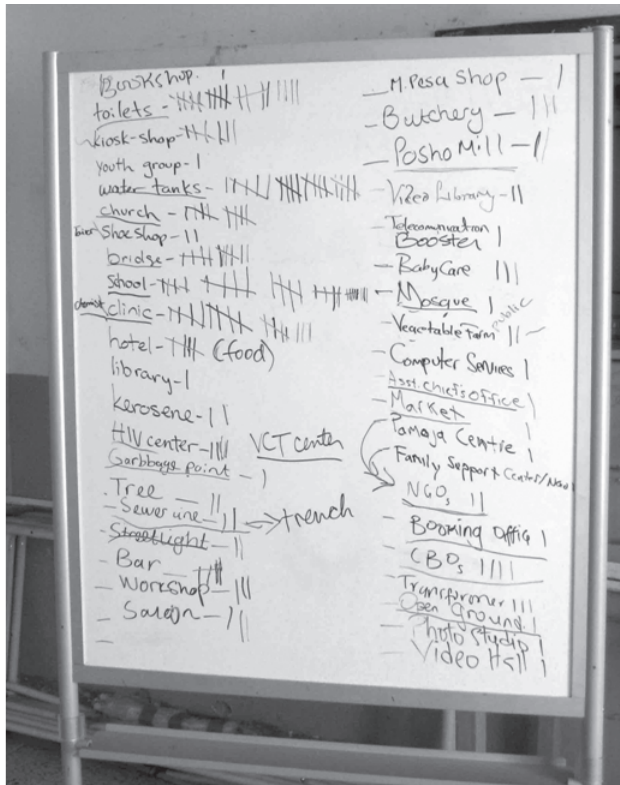
Figure 2. Points of Interest.

clinic workers, and others to gather local stories for their news channel, Kibera Worldwide; those stories could be associated later with points on the map. We wanted the project to have multimedia components so the map could eventually be brought to life with videos made about the points of interest on it. A lot of the footage was taken of the mapping activity itself, which was used to create a short documentary on the mapping.[9]

After three short weeks of intensive mapping and editing by the team in the computer lab, the map was complete—possibly the densest map ever made.

Even at this early stage, the project had many observable results. The participants reported that they had learned new computer skills and were feeling comfortable with unfamiliar new technology, like GPS. Many were afraid at first that they would not master the technology, and then proud when they did. Several mentioned gaining new social skills and comfort in public speaking and encountering strangers. A sense of group identity and unity was another achievement they treasured after having overcome various conflicts. Some also reported gaining new knowledge about the impact technology can have on a community.

Equally important was the fact that the mapping experience validated the knowledge that participants already held: their intimate knowledge of the paths,

businesses, and social relations of their own neighborhood. Now they were regarded as holders of important information rather than poorly educated slum dwellers. This continues to be a primary concept behind Map Kibera's work, but it remains a challenge because such local knowledge is traditionally held in low regard.

Meanwhile, few in Kibera had seen themselves on a map before. From the start, local groups liked the mapping project. Whether seen as a skill training for those on the other side of the digital divide, or a way to get important and accurate data, or a potential tool for the advocacy work of the organization, or even simply a practical way for visitors to find their way around in Kibera, it was widely embraced as a basic entitlement: the right to exist on a map. Local organizations were keen to be represented, and when we made a presentation to local NGOs, almost everyone was eager to learn how they could use the map to highlight their activities or how they could use these tools in other parts of Nairobi.

However, it was clear that the project could not end there. Kibera is notorious for challenging, cynical, shrewd, and even confrontational questioning of the many development projects that flood the area. This can be extremely helpful for thinking through tough questions and honing in on the usefulness (or futility) of a project. Many Kiberans who asked what the mappers were doing did not see how a map available only online could benefit them or their community—besides which, they already knew how to get around. The concept of community-owned information was abstract, and the very idea of self-representation raised the question, representative of whom and for what purpose? Even if, as we imagined, the primary users would end up being local groups working on advocacy directed at government ministries or others who could access the web, the average citizen needed to see the results as well.

NGOs seemed to use a common methodology to engage the community: recruit young people and teach them facts—on HIV, gender, sanitation, malaria, safety, etc.—that they could then impart via community meetings, theaters or concerts. But we wanted them to be researchers themselves, not merely distributors of

> NGOs seemed to use a common methodology to engage the community: recruit young people and teach them facts—on HIV, gender, sanitation, malaria, safety, etc.—that they could then impart via community meetings, theaters or concerts. But we wanted them to be researchers themselves, not merely distributors of knowledge imparted by others.

*Millicent Achieng, a Kibera resident, records a point of interest during initial mapping. (*Photo credit: Erica Hagen)

knowledge imparted by others. We wanted the entire community to have a resource that would harness their collective wisdom and intimate knowledge of Kibera, so they could become the drivers of development. These aims became the primary motivation for most of the activities we developed in Phase 2. Sustainability and community impact were clearly much greater challenges than the map production had ever been. The digital divide was also a complex challenge: although many residents of Kibera could access the Internet at cyber cafes, they saw the web not as a participatory tool for change but as a way to seek information and chat with friends. Web 2.0 concepts of two-way and crowd-sourced content hadn't hit most of the Nairobi elites, much less Kiberans. We had a long way to go.

However, we recognized that digital information need not be kept exclusively online. Thus Map Kibera planned to make paper printouts of the map to post in public places and distribute around the neighborhood. This idea grew into the issue-based community meetings we added in Phase 2, where residents could add information to paper maps that featured separate themes like health or education.

But perhaps the greatest challenge in Phase 1 was to inspire a sense of commitment to long-term skill building and volunteerism. This is a complex issue in a place where few young people have any source of income and get by day-to-day through small jobs and handouts. In wealthy countries, volunteering is the basis

for the open-source technology community, but the developing world needs a different model if it wants to reach beyond the elites. In Kibera, particularly, many NGOs come through briefly and hire residents to participate in their own information gathering and in hundreds of small projects, workshops, and events that offer token payments but do not impart useful skills.

Whether the NGOs are conducting focus groups or user testing, needs assessments, household surveys, or impact assessments, many people participate in each and every NGO opportunity and expect payment for it, without ever developing any marketable skills or being hired permanently—much less receiving the results of the assessments or considering what they mean for Kibera.

This is why we were determined that the training we offered would help the participants go somewhere. We wanted the local youth to begin to network with Nairobi's technology community and start to bridge the digital divide: we wanted them to see career possibilities in ICT, or information and communication technology.

PHASE 2: FEBRUARY-OCTOBER 2010

We started to plan for Phase 2 immediately following Phase 1, returning to Nairobi in February 2010. In fact, it seemed like Phase 1 had just been laying the groundwork. While the map of Kibera had been created, the project would require more work to become an information resource that was truly useful to the community. As the project went on, we began to value more and more the intensive community-based work that would be needed to achieve our goals.

We also began to look at the entire communications environment within Kibera. We wanted to push further, to develop a model for a comprehensive, engaged community information project. We tried this out in two ways: by extending the mapping work to gather more in-depth, issue-based information and engage people in the community through paper maps; and through citizen journalism, or reporting by non-professionals on important local issues and news.

Citizen reporting is an essential component of creating local, accessible information resources and a step toward Kiberans reclaiming knowledge about Kibera. We defined citizen media by principles like independent editorial control, emphasis on content and creativity rather than professional production quality, and opening up tools and resources to as many people as possible.

Our citizen journalism effort included an extensive program of online media that included two new projects: the Voice of Kibera at voiceofkibera.org, an online community information and news platform, and the Kibera News Network, kiberanewsnetwork.org, a citizen video team. We also expanded the mapping into a program of GIS and issue-based mapping that included community participation. The goals of these projects were to allow Kibera residents to speak for themselves on current events and issues, and to create a digital community around local information.

Figure 3. Screenshot of Voice of Kibera

Voice of Kibera and SMS reporting

To realize the broader vision of the project—not just a one-off map, but a community engaged around open and shared information—geo-located citizen journalism could provide a strong, comprehensive picture of Kibera's reality and support community goals. So, we used the Ushahidi software to build a website called Voice of Kibera. We wanted to see if the software could be used for mapping non-crisis local news in Kibera. The local media—including the *Kibera Journal,* Pamoja FM community radio, and Kibera Worldwide, the only outlets that cover Kibera from inside—could then map their stories.

So, we connected with the *Kibera Journal* and Pamoja FM, and planned to feed in YouTube videos by Kibera Worldwide, the video team we worked with at CFK. It seemed likely they would want to collaborate on Voice of Kibera in order to boost their profile and share their work online.

However, in order to produce media for Voice of Kibera, each media outlet needed a site where they could produce an RSS feed.[10] So we initiated trainings in Wordpress software[11] and helped these groups get their work online. Wordpress allowed them to design their own sites quickly and to publish content without hiring a costly web designer. In the end, though they were supportive, they were not ready to come together on the Voice site for a variety of reasons. Those who adopt new technology are often not entire organizations or those who first show an interest—it is often not the leaders of organizations who have time to learn the new tools, but unemployed youth. These youth ultimately then have to create the "proof of concept" that convinces elders and others of the real value of a new idea.

SMS, or short message service, also presented a great opportunity for citizen reporting. Most of Kibera's approximately 250,000 residents either own or have access to mobile phones through friends and family, which made almost every Kiberan a potential reporter. Thus, in addition to Voice of Kibera itself, we were able to use an SMS shortcode that our partner SODNET had secured from the major mobile carriers.[12] SODNET's SMS gateway filtered incoming SMS into other applications according to keywords. Messages with the word "Kibera" fed directly into the back end of Voice of Kibera; they then had to be mapped and approved by an editor before appearing on the public site.

Once we had the website and the SMS code, we considered helping individual groups use SMS to report on services and our target issue areas. We thought using community monitors would be a good way to take the pulse of the neighborhood. We considered partnering with KCODA's community monitoring program to create a site where people could comment on the activities of NGOs, so that useless or "briefcase" organizations would be rooted out and citizens could request better services. This met our basic goal: to alter the existing power and information dynamic so Kibera residents could increasingly influence their own local development.

While we hoped Kibera residents would simply want to send SMS reports to the site, we did not expect them to do so quickly. We needed to advertise and to show that there would be some result from their 5 shilling expenditure (about 6 cents US). We first talked to groups that came to the participatory mapping meetings, which we describe below. After each map-drawing exercise, we explained to the participants that they and other Kiberans could continue to report on the issues we had discussed by sending an SMS, and that this information, along with the maps and drawings, would all be available online. People seemed intrigued and to sense that something exciting was going on, and they wanted to be part of it. But we didn't get any SMS messages. We did, however, collect names of interested people and invite them to a focus group on the Voice of Kibera tools.

We demonstrated Voice of Kibera and the SMS function in detail to the focus group. Several attendees suggested that it would be crucial to have a trustworthy editorial board to approve the incoming material, citing manipulation by the media during the recent post-election violence. So we invited them to form such aboard. A group of six young men volunteered, and over time five of them became

Voice of Kibera Reports: A Sample

Between April and December 2010, 386 reports in 32 categories were approved and posted on the site. During this time there were 20,784 page views. Most visitors were from the United States, followed by Great Britain, Kenya, and Germany. Visitor statistics during this period were countries, 83; unique visitors, 6,572. The reports below are a small sample:

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Free World Cup matches at Mchanganyiko
Kibera Community Youth Programme is showing free world
cup matches at Mchanganyiko halls. NO Vuvuzels please!
6-13-2010, Mchanganyiko Hall, Karanja


Protests
Protesters are at the Kibera law courts to have Member
for parliament of MakadaraSonko released. Police have
arrived shooting teargas in the air to disperse . . .
11-28-2010, Kibera Law Courts


Heavy downpour
Kibera law courts' gate is impassable . . . water every-
where. This is as a result of the yesterdays heavy down-
pour.
11-15-2010, Makina


Illegal power line removal in Laini Saba
Police out to remove illegal electric power lines in
lainisaba, kibera.
08-12-2010, Laini Saba, Kibera


Illicit brew
10 people confirmed dead, several hospitalised under
critical condition and others unconscious after taking
illicit brew at Soweto near Highrise.
07-26-2010, Soweto near Highrise


Computer training session
In partnership with Pamoja Youth Foundation, a free
basic computer training session was offered Saturday
morning at Ghetto Light Hall. PYF organised the . . .
06-19-2010, Ghetto Light Hall, Olympic
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the managers of the project. One, Douglas Namale, was editor of the *Kibera Journal,* and he suggested that they would need to function much like a newspaper editor, including verifying reports. However, they agreed that reports could be coded as "unverified" to allow them to post nearly all submissions. They primarily checked that material had not been intentionally falsified along political lines, and to date this has not been an issue.

We left development of the concept up to the editors as much as possible. They quickly became advocates for the site, submitting and approving reports. While our goal was to have the general public aware of the shortcode so they would use it to submit information, we felt these board members could kick it off most effectively and that they had enough enthusiasm to experiment with the site and explore its potential. The five members split up the duties of submitting SMS reports on news in Kibera, approving incoming reports and newsfeeds, and posting them to the site (when SMS come in they are not immediately visible to viewers but must be approved and located on the map). The SMS reporters operated like roving journalists, posting notices on breaking news as well as events and opportunities for residents, each in 160 characters. The site began to shift from being an aggregator of other local media to a media channel in its own right.

One problem kept the site from being completely useful: residents could only access it on a computer in a cyber cafe. While we did convince one café to make Voice of Kibera its homepage as a means of advertising, it had only a small impact. Another challenge was that even a 5 shilling fee for submissions seemed prohibitively high. We needed a mobile web tool, which we found with the release of Ushahidi 2.0, which included a plug-in architecture. One of the first plug-ins developed was a mobile phone browser version, which promised to resolve some of the problems with access and cost. This made it possible for Kibera residents to both submit and view reports by phone, providing the phone was web-enabled, which made the cost of accessing a website minimal, even negligible.[13] We estimated that about a quarter of young people in Kibera had this type of phone. The group then began a broader outreach campaign and a media launch plan that used traditional media channels (local radio, print, banners, and posters) to advertise that Voice of Kibera was available as a platform for sharing community information. Voice of Kibera also began developing an SMS alert system for residents.

We found that the early adopters of Voice of Kibera were either interested in promoting their own work or had an exceptional interest in technology and the Internet. For instance, one board member ran a football NGO and posted locations of upcoming matches. These organizations generally had no other online presence and were interested in marketing their activities to Kiberans and to the greater Kenyan and global community.

Other organizations sometimes showed support, but for anything to move forward they had to have an internal "champion." People interested in the Voice of Kibera site tended to use technology more than the average Kibera resident and seemed excited by the potential for Internet communication. Reporting, however,

focused mostly on a few regions of Kibera. Clearly we had not yet reached our goal of broadly crowdsourcing[14] news.

After a few months, the editorial board developed the following definition of Voice of Kibera. We think this demonstrates the fact that the group has embraced and expanded on the vision we set out with; the longer-term task is to share the site with others in Kibera and engage as many people as possible.

1. It is a nonprofit and independent community information-sharing platform by, for, and about Kibera.

2. It uses (a) articles, photos, videos, and SMS; (b) a unique information mapping tool; and (c) moderation of content to ensure accurate reporting.

3. It is a unifying and catalytic agent to contribute to positive change in Kibera and Kenya.

4. It is a citizen journalist website sharing the real story of what Kibera is.

5. It aims to fill current information gaps in terms of emergency and accurate information, adding location data when relevant.

Citizen Video Journalism: Kibera News Network

Based on the lessons we learned in Phase 1,we started a new and more extensive video news project. I began training a video news team called Kibera News Network (KNN), initially hosted by KCODA. KNN is also linked with Voice of Kibera via an RSS newsfeed and is a major source of geo-located content for that project.

The first group of videographers, Kibera Worldwide, had little institutional or programmatic support; it primarily reported on the many activities of its host organization, CFK. Our concept was to train various youth in video news production to create an asset for the entire community, and to establish a platform that could be non-proprietary. Efforts to establish Kibera Worldwide as a cross-organizational, collaborative group faced challenges too great to overcome.

So, we decided to start KNN as a collaborative community video news channel—or, as it is called in Kibera, "TV online." We engaged KCODA because of its commitment to community media as the publisher of *Kibera Journal*. KCODA also had intentions of becoming a "digital village"—a Kenyan ICT board designation for community Internet resource centers. They had several donated computers and were planning to open a cyber cafe, and two promising Kibera youth with film-making experience were already interested in starting a TV news project, so this was a natural place to start. I started working with these two youth in April 2010 to train about 18 young people to use the Flip cameras and Flipshare software, which would help them cover features and news events of their own choosing. In fact, they chose the name KNN. They soon started to publish videos on YouTube.[15]

Initially planned as a small, once-a-week class at KCODA, the activity quickly grew into a project. KCODA and the two leaders recruited the trainees. We started with 6 young women and 12 young men aged approximately 19 to 25; 5 of them came from the group of mappers. On the first day they came up with story ideas.[16]

Figure 4. Screenshot from KNN Videos

Several then asked to come and work on videos every day, so we created an editing schedule to ensure that one of the leaders would be there to help them. Soon they wanted to learn more complex editing and shooting, so the class became a full-fledged project involving a weekly meeting, viewing of that week's products, training days, and practice assignments.

Despite a range of technology problems, the team members noticeably improved their editing skills over just a few months. They produced ever more interesting and well-executed videos, even without much training except for what the leaders could offer casually in their daily interactions. They chose all their own topics and did the final cut on each video. Map Kibera retained no editorial con-

trol, beyond making certain editing suggestions to improve the stories and sometimes correcting spelling. I stressed the special value of their point of view in the community, their unique perspective as Kibera residents, and the overall importance of local media. But I hardly needed to do so: they already had a strong drive to present Kibera's positive side while also covering negative incidents more accurately. They had great pride in their community, which was essential for providing a social service like local news coverage.

The drive to provide video coverage persists in spite of the challenges to filming in Kibera. The community at large is resistant to being on camera, having been filmed and photographed repeatedly over the years by visiting foreigners. They see no benefit in having their image taken and often believe (sometimes rightly) that the videographer is selling their likeness for profit, whether in a movie or by pretending they're doing some charity work and the pocketing the donations, and they want a share of it. They either hide from the camera, demand money, or threaten the photographer.[17] I've accompanied documentary crews followed by jeering people asking for money.

The KNN team has managed to overcome the most such resistance, largely because they are students and volunteers from Kibera. However, serious problems have arisen on a few occasions. One KNN member was arrested for filming near a police station and we had to pay the police to release him. During a violent event, such as a riot, filmers have had to flee angry residents and narrowly escaped. One member's phone was picked from his pocket while he was filming a challenging scene.

In spite of these challenges, the group succeeded in covering current events in Kibera from a perspective that no media house outside the community could ever achieve. The videos included everything from a story about a Muslim girl who found a prophetic mark on a small frog to Kiberans' views on the new constitution. Between April and September 2010, KNN covered 101 stories that included the following headlines:

- Talent Show in Kibera
- Rose's Orphanage in Kibera
- Biogas Center in Kibera Investigated
- Power Disconnections Leads to Riot in Kibera
- Fire in Kibera Claims 18 Houses
- Community Clean-up along Railroad in Kibera
- Ugandan Circumcision Ritual in Kibera
- Former Residents of Soweto East Give Mixed Reviews of Slum Upgrading
- Pascal—Bone Jewelry Maker
- Frog Decorated with Name of God Found by Kibera Girl

The potential subjects in Kibera are endless, and the team began to recognize and seek out interesting news. They tried advertising themselves to get news tips by creating small flyers that could be handed out like business cards. We also thought KNN could use news tips directly from Voice of Kibera, so when someone reported in, KNN received that information immediately via SMS or another alert

**User Friendly? Barriers to Using Video Technology
in Communities Like Kibera**

1. Software developers assume that each user has their own equipment and computer that is kept in a secure location and not shared with others.

2. The equipment relies on Internet connectivity, for instance, access to Help files.

3. The batteries are not easy to recharge. If the device must be plugged directly into a wall socket, it's hard to keep it secure for a long charging period.

4. Software is almost never designed for multiple users. Flipshare and Moviemaker do not easily allow for multiple files for different users or various libraries, or for shared external hard drives moving among several machines.

5. Developers assume that anyone using visual media must have a Macintosh, but Macs are prohibitively expensive in Africa. Cameras record in Mac-friendly formats, which need to be converted.

6. Equipment is simply not made to withstand wear and tear or dirt, dust, and mud. We often think manufacturers are building disposable devices. I have been most impressed with children's computer equipment, which is rarely available. This is why we stayed with Flip (now discontinued!) despite its limitations, even though other camera models offer more functions.

system. But our efforts to bring these groups together into one reporting loop were slowed by issues like the lack of Internet access at KCODA and the lack of a working alert function in Ushahidi/Voice of Kibera. Instead they went a more traditional route: simply finding informants and building a reputation in the community. We also hoped each video journalist would send a report to Voice of Kibera each time he or she covered a news story, while also receiving instant outgoing alerts from the site. It's more likely that something like this will happen simply by bringing the groups closer together socially and organizationally than by focusing on the technological benefits to the individual.

By this stage, KNN had also developed a board, which met weekly to discuss business and strategic matters, and a logo. The two leaders chose a core team of 14 to carry the group forward. These 14 were selected for their demonstrated commitment: they actually worked on videos and did not only show up only when the meeting concluded with a free lunch. The team began to adopt a more professional and dedicated outlook and to take on more ownership and management of KNN. They also asked for more money. We suggested that they form an organization or join with the newly registered Map Kibera Trust to raise funds and become sustainable. Meanwhile, we covered the cost of lunch twice a week in recognition of their demonstrated commitment. KNN's budget was quite small; however, the members seem to appreciate that it was a potential career path and therefore were willing to continue putting in time and effort. Filmmaking and journalism, even when primarily online, could be easily envisioned as livelihoods (while mapping

Ensuring that Female Voices are Heard

Both KNN and Voice of Kibera have found it hard to recruit and keep female members, and thus maintain a gender balance in their membership. We have discussed the issue at length with participants. Voice of Kibera began as a group that self-selected out of our initial focus group; there were no women on the editorial board. When we recruited a bigger team of SMS reporters, the board made a special effort to find interested girls. This group then had three young women, but the balance was still heavily male. At KNN, we started with more females, but they tended to lose interest quickly. So, we recruited more girls through the male members until we found two or three who were fairly committed.

Why are girls less interested? We learned that this is a Kibera-wide problem: unless a group is created especially for them, female participants tend to be less outspoken, less confident, and less reliable than the males. It is not necessarily a matter of gender and technology; in Kibera there is little if any stigma about girls using technology or having a technology career. Some of our members acknowledge that many young women are single mothers or have other family obligations that boys don't have. So, we wondered, did we need a special program for girls?

In fact, the mapping group is gender balanced; over time, the young women in the group began to speak out and become more dedicated to the project. They were selected as part of a committed project team and did not self-select as they did in the other programs, so in a sense they were forced to remain until they began to feel comfortable. In our experience, the girls start out less committed and more interested in monetary reward, but in the long run become equally if not more committed to a project. We have been exploring possible partnerships with girls' groups and schools to make sure they can participate and share their views. We hope to use these partnerships to provide extra support to girls who also are part of our teams. We have also supported Akira Chix, a local organization which promotes social technology and computer careers for girls.

and online media, by contrast, are new and emerging fields without proven employment track records).

Issue-Based Mapping and PPGIS Community Forums

To increase the potential impact of the map data, we began mapping in more detail in four areas: health, security, education, and water/sanitation. We chose these four as test issues; they were not intended to be comprehensive. When participants gathered details, they entered them directly into OpenStreetMap to create a secondary database layer.

In February 2010, Map Kibera developed a partnership with UNICEF to support issue-based mapping and added a focus on mapping girls' security. UNICEF was interested specifically in capturing the views of girls and the potential threats

Joshua Goldstein leads a group in a participatory mapping activity on security issues in Kibera. (photo credit: Anusa Pisanec)

to their security and their vulnerability to HIV/AIDS. We also took on a consultant from the UNICEF innovation team to work with us in Kibera on this activity, which is sometimes known as Public Participatory GIS.[18] This issue-based mapping was happening concurrently with the early stages of KNN and Voice of Kibera, from about March through June of 2010.

Most of our mappers wanted to work on this new phase; nine of them became the core of the mapper team. We also started working with a new local project coordinator and began the process of establishing a local trust to formalize the mapper group in Kenya.

For each issue, the mappers carried paper forms, writing new information based on a short survey developed in conjunction with stakeholders and community members. For instance, in the area of health they gathered information on each clinic or chemist in Kibera, such as services provided and the number of trained nurses on staff.[19] Some of the mappers also carried digital or Flip cameras to take photos of clinics or short videos of toilets. We specifically asked the mappers who had also joined the nascent Kibera News Network to use the Flip cameras to visually document the places they were mapping. We began posting the images to Flickr, which allowed us to add these images directly to the map of Kibera from OpenStreetMap.[20]

To help us get feedback on the maps and share them with the community, we printed paper versions of the map for each issue area and presented them at small

*Kevin Otieno records Douglas Namale as he leads a participatory mapping exercise on health in Kibera. (*Photo credit: Erica Hagen)

community meetings. We taped transparent paper on top of the printouts so the attendees could make corrections and add their opinions and other details about each sector.

We initially had the mappers organize these meetings, inviting local people who had some interest in that particular theme. Our first health meeting was very well attended—both by health workers and others with no special interest in health. We split into four groups and people then drew on the map, describing their use of services, problems in health provision, distances traveled to access particular services, and wishes for improved services. The mappers helped with the exercise and also helped record it, filming with Flip cameras. We then scanned each transparency and uploaded them onto an image of the map online. We also began to develop separate web pages for each issue area, where we entered our own notes as well as the maps and multimedia.

The second meeting attracted fewer people, maybe because they had learned they would not receive any payment for attending. Organizations in Kibera typically "pay" people to participate in almost any meeting or activity, offering money for lunch and transportation to express their "appreciation"; we only gave out a small amount of mobile phone airtime and a few refreshments.[21] We then decided to organize the next meetings through networks of stakeholders who would have a strong interest in the map and in using it afterwards for advocacy. In the area of

A Word on Technology Nuts and Bolts ━━━━━

Equipment security: Our video equipment was five standard-definition Flip cameras donated by UNICEF, four high-definition Flip cameras purchased for the project, and two donated (and quite slow) computers. We started by issuing each team a camera, which they had to sign in and out at KCODA. Cameras were kept in a locked cabinet; one went missing for about two weeks and another disappeared entirely. In general, though, hardware security was less of a concern than we had expected. People often carry home—and sometimes lose—smaller pieces of hardware like flash drives and headphones, but when a camera went missing the entire team was very concerned and tried to catch the thief. The GPS devices were carried by us to and from Kibera as needed, and none was lost or damaged.

Viruses: We suffered from many debilitating computer viruses that were often transmitted by the Flips, which also function as USB drives. Viruses are a huge problem in developing countries, where expensive anti-virus software is impractical, as it must be updated over the Internet. Even after installing the software, we still found it difficult to keep the computers clean.

Managing data: To some extent, problems arose from the members' lack of computer skills (how to browse for files, use "Save As" protocols, etc.). File organization was a frequent part of training, and members had trouble signing in and out of accounts and finding files. But overall, the project revealed that computer hardware and software built for the rich world simply do not work in a developing country context. These examples are far from the whole story (see, e.g., text box "User Friendly?" on p. 85).

Internet Access: Another challenge was uploading data, reports, and videos. KCODA had not yet managed to get the Internet installed, partly because providers do not care to come into Kibera and usually do not show up at the appointed time. We later located a cyber cafe in Kibera with decent bandwidth, so members could upload videos themselves. During the mapping, we were able to use partner offices of SODNET in Nairobi, but this required chartering a bus so members could travel to and from the offsite office. Having a location in Kibera equipped with Internet and computers would have been ideal; in fact, we have since opened an office to house the trust in Kibera.

health, we connected with AMREF (African Medical and Research Foundation) and their community health workers. The meetings around security were held with two girls' groups called Binti Pamoja (part of CFK) and a women's group, Kibera Power Women, that works on security.

The meetings were very successful in illustrating the subtleties of each issue. Stories emerged that we believe revealed the real picture of health, education, security, water, and sanitation in Kibera as the residents experience it. For instance, we learned about the shortage of affordable maternal health care, the amounts that

various clinics charged, the address of the best midwife, and the proliferation of low-quality chemists who prescribed inappropriate remedies. We also noted that chemists who had unlicensed examination rooms sometimes played critical roles, that people with acute emergencies often had to be carried several kilometers along mud paths to the government hospital, and that Kibera had no mental health services, dentists, or opticians.

We found a strong interest in using technology to support each issue, but the challenge was to help the participants use these tools for their own advocacy and planning. Since our goal was to be non-extractive—to avoid using the community to collect data without enhancing its own ability to use the information for impact—we had to support small, technology-challenged groups and share information in ways that would move policy toward their objectives most effectively. One approach we tried for this was mobile reporting, as discussed above. Another was to engage those who stood out as innovation leaders to use our websites and maps themselves. Certain people seemed to understand how technology and storytelling could support their objectives, and we tried to continue working with them and to help them make a clear link to their own goals. This was a slow process, however; while the majority of people recognize the power of the Internet, very few in Kibera understood even the basics of how it works. Therefore, we became interested in how to engage average residents while maintaining a core group of Internet-savvy activists to translate information into action.

During the map-drawing exercises, the participants often were initially under the impression that we were either researchers or experts on the issue we were presenting. What we were doing was actually quite unusual. We were talking about specific issues, but it was not a focus group. We had no expertise in education, but we believed that having strong information about education in a shared information commons could be useful to citizens in marginalized communities whose children needed to go to school. In practice, we needed to establish clearer follow-up routes so that people could meet specific goals by using the maps. It was quite easy to show the value of citizen-generated information on schools to larger organizations like UNICEF, since it is so hard to collect accurate data on things like the number and quality of informal schools in Kibera. But to translate this into a community resource and tool was more difficult. We began to develop a printed atlas to hand out with specific information on each issue.

We found that it was important to meet individually with networks of groups involved in thematic areas to help support them—a lengthy process. People often asked us what concrete results we could see after less than a year from the start of the project. It's simply not practical to expect policy shifts or large-scale results in such a time frame. However, we also learned that access to information alone does not lead to action, nor does it support ongoing advocacy and development. Groups must be empowered to make use of information, which requires a tailored approach. For instance, we helped develop a website to locate government-funded projects and share information about their quality and budget.[22] The Map Kibera

Trust has now been established in part to work toward greater community impact in the longer term.

Since it is not possible to support each and every group in Kibera, it is also important to create general awareness about the open information that is available and about our toolset, and to continue to train interested individuals in using these tools to support others. We hope to slowly counter the misuse and temporary nature of tools that come with limiting factors, such as proprietary licensing and expensive software and devices, as well as the practice of collecting data that is simply impossible to share, online or otherwise.

CONCLUSION AND UPDATE

The techniques I've described in this article have the potential to represent the multiple realities of a community, and to aggregate their subjective opinions into a collective version of truth. The facts on the ground about location, which are visible and objectively verifiable, can be layered with the lived experiences and news reports that residents want to include. This process comes closer to local truth than a simplistic survey methodology used to "gather" information, but the information collected can also be combined with external data to make the case for reforms. It provides much-needed communication tools for the community itself on a hyperlocal level, which allows Kiberans to discuss and report on what matters most to them.

Since winding up the activities in Phase 2, we have undertaken an ambitious scaling-up of the project from one slum to two. We chose to work next in Mathare Valley, the second largest slum in Nairobi, because several groups requested help there in creating projects like Map Kibera, and because we were able to partner with Plan Kenya, which already had a participatory development project under way there. Concurrent training in mapping and video, along with a blog and a Voice of Mathare website, enables us to test the replicability of the concept and allows participants from Kibera to train and support others to accomplish what they have.[23]

We are not huge fans of the bigger-is-better concept in development; we like to think more like artisanal craftspeople, choosing high quality of attention and depth over breadth. So we did not attempt to go very large right away, though others hoped we would. Larger organizations and institutions were eager to see map data for other informal or unmapped areas, particularly the type of data we were collecting on public infrastructure and informal services. But we felt the need to plan carefully for the next project in order to maintain community involvement— or better yet, increase it. There is a very subtle point here about building community ownership over something so new: if we aren't serious about listening deeply to each community, the entire purpose of the project is lost. If there is one thing I could stress to those who wish to do a project like this, it is that community data collection risks being an extractive process, just like traditional surveying. A great deal of work must be done to create something that does not just layer on top of a

community but actually serves them. Unfortunately, this brings us back to an old lesson we in the development field still seem reluctant to learn: technology is easy; real social change is still the most difficult—and most important—part.

Our primary challenge thus becomes how to truly empower residents of Kibera in very complicated processes that have traditionally been exclusionary. Luckily, we have a great weapon. By virtue of being attractive, new, and global in reach, digital technology can help Kibera youth (and others) gain a level of respect that they have never been granted before. The fact that larger institutions want the information they have collected means that Kibera residents could have new leverage among stakeholders, which could ultimately lead to having a greater say in decisions that affect them most. Achieving this goal is what the Trust is undertaking as part of its mission.

In terms of methodology, we'd like to encourage dissemination of ideas, rather than overly planned, top-down development; we believe that if an idea is good enough, it will spread naturally. GroundTruth's current role is to continue to train and initiative projects, and to help support others in designing their own projects. This is primarily because the process is tricky, whereas the products you can see online seem deceptively easy. Technology cannot be adopted wholesale but must be tailored to each context, thus it is never clear at the start what will end up being useful in each local context. This is an area where experimentation and willingness to fail, adapt, and iterate (values from the technology field) are needed to avoid the pitfalls of overly ambitious and large-scale replication of something that was successful halfway around the world. Starting small may confound donor structures, but it allows communities to learn and adapt and try things out.

We have also had the opportunity to reflect, to learn from Kibera, and to restructure the program. One major development is to include more participatory development theory in our program plans. In late 2010, we collaborated with the University of Sussex Institute for Development Studies on research that allowed all members of Map Kibera to discuss and evaluate the program to date.[24] We had difficult group discussions with participants on subjects like their expectations for livelihoods and community engagement. Following this process, we incorporated many techniques from participatory development by working closely with Plan Kenya on the Mathare project, along with their local partner, Community Cleaning Services. This included holding a large community meeting to determine needs, and beginning the new project with key Mathare people taking on major organizational and leadership roles. The context in Mathare is very different from that in Kibera, but we continue to evolve a methodology that is at the intersection of participatory technology and participatory development.

The long process of incorporating in Kenya is also now complete, and the Map Kibera Trust is official. The trust is proceeding through organizational development processes with support from Hivos,[25] and each of the three programs—mapping, Voice of Kibera, and KNN—will be represented in a leadership body. These programs have a great deal of autonomy, and therefore responsibility, and have been working to create their own strategic plans, including budgets and fundrais-

ing strategies. The transition from small pilot project to institution has not been easy by any means, but the group has weathered a great deal of uncertainty well.

Mikel and I have left Kenya, but still serve as board members to the Map Kibera Trust. Our competent friends and staff—Jamie Lundine, Primoz Kovacic, and Jane Bisanju—lead the trust locally as of this writing. As part of GroundTruth, Mikel and I are now embarking on new activities in other parts of the world. We believe that if we step back from the day-to-day operations of Map Kibera, the organization will eventually be stronger for it.

Looking to the future, we see the generation and use of both media and data leading to the greater influence by underrepresented communities worldwide in the processes of development. By shifting the dynamics of who creates and owns information about a place like this slum—of who is able to narrate its stories— power and political dynamics that have kept residents from being true participants in their own development and governance must eventually shift. If there is one thing I learned in Kibera, it is that decisions that affect an entire community— including how it is built and rebuilt, and what priorities should be addressed and how—should be determined primarily by those people who must sustain the impact of such monumental decisions. This may be a messy way to govern, but the alternative will be resentment and, ultimately, violence. As one small piece of the puzzle, the promise of new technology is that the cacophany that is our modern world can be heard to the fullest. We hope that it can also turn up the volume on the softest voices, and make the rest of the city, country, and globe listen.

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1. It is notoriously difficult to conduct a census in any slum, where populations are transient and crowded and the layout is complicated. A recent Kenyan census put the total at 170,070, but many have claimed, without references, that Kibera has up to 1.5 million residents (see http://www.whitehouse.gov/blog/2010/06/08/audio-slideshow-dr-biden-sees-slums-kenya). See our analysis on the blog at http://www.mapkibera.org/blog/2010/09/05/kiberas-census-population-politics-precision/ and the Nation newspaper's response, which takes pleasure in the apparently lowered number: http://www.nation.co.ke/News/Kibera%20numbers%20fail%20to%20add%20up/-/1056/1003404/-/13ga38xz/-/index.html

2. See Clay Shirky on the power of crowdsourcing in his book, *Here Comes Everybody: The Power of Organizing Without Organizations*, Penguin Group, 2008.

3. www.groundtruthinitiative.org.

4. www.openstreetmap.com

5. Ushahidi (ushahidi.com) is an open source software tool developed in Kenya during the post-election violence of 2007 that is often used to map crisis events and response. It allows users to aggregate feeds from emails, SMS, web forms, and newsfeeds onto a map. The software is customizable and can be used to create websites, which we did for Voice of Kibera.

6. www.sodnet.org; http://cfk.unc.edu/

7. http://vimeo.com/10611434

8. http://josm.openstreetmap.de/

9. http://www.youtube.com/watch?v=RYuZZNEU_gI; Phase 2 built on this work, as the project created a more comprehensive online video newsgathering training and program.

10. Really Simple Syndication—a way to syndicate content easily on the web.

11. Available at www.wordpress.com.

12. Shortcodes are four-digit phone numbers, usually expensive and difficult to obtain; they are often used commercially because they're very easy to remember—for instance, to let people send votes and opinions to companies and TV shows, such as www.bigbrotherafrica.com. However, after several months we abandoned the shortcode for a full-length telephone number, for a few reasons: the interface from SODNET kept breaking down, and after a price war the cost lagged behind, with shortcode messages costing 5 Ksh and regular SMS 1Ksh.

13. About $0.25 for 25 MB http://www.safaricom.co.ke/index.php?id=1011.

14. A process of inviting large numbers of people to participate in creating a single resource.

15. www.youtube.com/kiberanewsnetwork

16. http://www.mapkibera.org/blog/2010/04/09/kibera-news-network-list-of-story-ideas/

17. See *New York Times* op-ed by Kennedy Odede on the subject at http://www.nytimes.com/2010/08/10/opinion/10odede.html; also a blog post by Brian Ekdale at http://www.brianekdale.com/?p=62.

18. See www.ppgis.net

19. http://mapkibera.org/wiki/index.php?title=File:Health_services_data_collection_form_FINAL 2.doc

20. http://www.flickr.com/photos/mapkibera/map

21. One international NGO told us they give money for "lunch and transport" worth about three times the value of lunch in Kibera. Since funders would often pay for program costs but not actual wages, these payments are euphemistically referred to as "appreciation," "reward," "transport," or "lunch." This is interesting in light of the frequency of bribery referred to as "tea" (chai); organizations are ostensibly in favor of transparency, but they perpetuate a shadow economy. Of course, we too gave out airtime and lunch money and sometimes small stipends.

22. http://cdf.apps.mapkibera.org/pages/home.php

23. http://matharevalley.wordpress.com/

24. See DFID, "Mediating voices and communicating realities: Using information crowdsourcing tools, open data initiatives and digital media to support and protect the vulnerable and marginalized," http://www.dfid.gov.uk/r4d/SearchResearchDatabase.asp?projectID=60805

25. The Dutch development agency, http://www.hivos.nl/english.

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