WORLD·WATCH

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FEATURES

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Mobile phone, mobile store—solar-powered in Kenya.

Front cover: photomontage and toilet paper dispenser by Lyle Rosbotham; Austrian larch forest by Johann Jaritz/Wikimedia.

DEPARTMENTS

Jin Suk

COMING UP...

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THINK MOBILE, ACT LOCAL

Leveraging the Rapid Rise in Mobile Phone Usage for Development

BY JOHN MULROW

Late in the afternoon of February 15 someone in Port-au-Prince, Haiti, sent the following SMS (a.k.a. text message) to an emergency response center:

NAN DELMA 33 NAN PAK T.OKAP LA NOU BEZWEN TANT, SI LAPLI TONBE NOU MELE!

The SMS went immediately via the Internet to a group of Haitian Creole speakers from around the world who had signed on to help with the relief effort. Someone translated: "At Delma 33, at the park we need tent. If it rains, we are in trouble." At the same time, someone else—also on the web—found Delmas 33 on a map and identified the roadside parks where the SMS could have come from. Finally the message, translated and located on a map, arrived in the hands of the Red Cross, U.S. Coast Guard, and other relief coordinators.

With post-earthquake rains threatening to cause landslides, building collapses, and miserable conditions outdoors, this SMS signaled the urgency of the need to get shelter to displaced people scattered in parks throughout Port-au-Prince. More broadly, this message and the thousands of other texts that came through this system combined to give the relief effort an unprecedented amount of precise, personal, and geographical data to act upon.

FOR A MOBILE WORLD, WHAT'S APPROPRIATE?

In the weeks and months following the 7.0-magnitude earthquake that rocked Port-au-Prince and devastated an entire nation, millions of Haitians were left without food, shelter, or sufficient access to clean water. Their greatest survival tools in the chaotic aftermath became their own strength, for pulling away rubble and carrying the wounded; their spirits, for consoling neighbors and friends; and their cell phones, for calling in help and directing the aid effort. While this last tool is certainly not as ubiquitous as strength and spirit in Haiti, it has played a vital role in the relief effort.

Such a quickly orchestrated and widespread emergency communications network could only have been possible in Haiti in very recent years. In 2002 roughly two in every one hundred Haitians had a mobile phone subscription. In 2007, more than a quarter of Haitians had subscriptions, and as basic SMS-enabled cell phones get cheaper (Vodafone just announced a US$15 phone it will bring to market this year) the growth is only expected to continue. Compare it to the creeping growth rate of any other communication technology in the developing world and it's clear that the world is going mobile…for everything.

What does this trend promise in terms of bringing greater economic and ecological security to more people on the planet? How can going mobile also mean, for example, going green? There is in fact a community of people and organizations dedicated to these questions. They fall under the term ICT4D: information and communication technologies for development. One of the mobile specialists in this community is Ken Banks, creator of FrontlineSMS, a free and

Courtesy of kiwanja.net

An all-purpose mobile phone kiosk in Uganda.

REUTERS/Eduardo Muñoz

Mobile phone chargers being rented out by the hour in Port-au-Prince, Haiti, six days after the earthquake there.

open-source software program that makes it easy to conduct mass SMS-based communications such as surveys or news alerts. It's now being used by small nonprofit organizations and rural communities in over 50 countries. Banks exudes a passion for using mobile as a platform for development innovations. He speaks at mobile tech conferences across the world about FrontlineSMS. However, he'll be the first to tell you that just getting phones in people's hands is hardly a solution in and of itself.

He says that development is in need of tools and programs that "genuinely inspire people on the ground—the users. This is the only way to ensure that development is sustainable." His talks often make it clear that Banks, among many other things, is a student of appropriate technology—a term made prominent by author E.F. Schumacher in his 1973 book *Small is Beautiful.* Schumacher's thesis is that the strongest and smartest way to pursue development is to maximize the use of locally available labor, resources, and ideas. It's a philosophy that is almost explicitly reflected in the FrontlineSMS architecture that Banks designed.

The program must be downloaded off the Internet, but once it is on a computer it requires no Internet connection, as all communications are performed by a mobile phone which is plugged into the computer. Messages can then be sent and received through this phone and managed in any way the user chooses. One basic use of FrontlineSMS is for mass messaging: A farmers' cooperative sends out updates on fair crop prices, or a church group sends reminders about prayer services. The program also has a ready-made survey manager and analyst as well as an address book where contacts can be sorted into groups—especially useful for organizations working with rural and widely spaced populations.

Does this setup truly fit Schumacher's definition? With the software developer worlds away from where the software is actually used, how could that possibly be considered local labor or ideas? But on his website Banks has written that his staff's remoteness from the projects is exactly what makes it appropriate:

> *There is no need for us to be involved at any stage, so no-one flies anywhere and no-one does any training.… The solution is designed to allow users to do everything themselves. No core FrontlineSMS implementations are driven by us, and none are our projects. Use is replicated by users sharing experiences, talking about their use of the tool to others, and growing numbers of*

champions who are either building their own solutions around FrontlineSMS, or bloggers and researchers who write about its use and impact.

The spread of SMS technology, and its various uses, parallels the explosion of innovation that often follows the discovery of a new material or technology. FrontlineSMS moves the innovation process along by providing a wider range of SMS tools without requiring much added technology or technical know-how. This further builds on the tenets of appropriate technology. One of Schumacher's greatest criticisms of development aid was the stifling of entrepreneurship that occurred when high-tech solutions were introduced but could not be innovated upon by the target population. He called this the "*negative demonstration effect* of a sophisticated technology infiltrated into an unsophisticated environment…. The introduction of an appropriate, intermediate technology," on the other hand, "would not be likely to founder on any shortage of entrepreneurial ability."

MOBILE APPS IN CONTEXT

Grassroots mobile innovation in developing countries certainly did not begin with FrontlineSMS. In fact, the innovations got started over 10 years ago when mobile phone users in the Philippines began trading in pay-as-you-go airtime for cash and using SMS to send credit to friends and family. Cell phone credit transfer became so popular that cell phone companies jumped in to formalize the process. Though "mobile money" systems were developed by many networks, the concept gained international attention when Safaricom, a Kenya based mobile service provider, launched its M-PESA service in 2007. M-PESA ("Pesa" is the Swahili word for money) allows users to deposit money into a credit account, withdraw money, and send money to others.

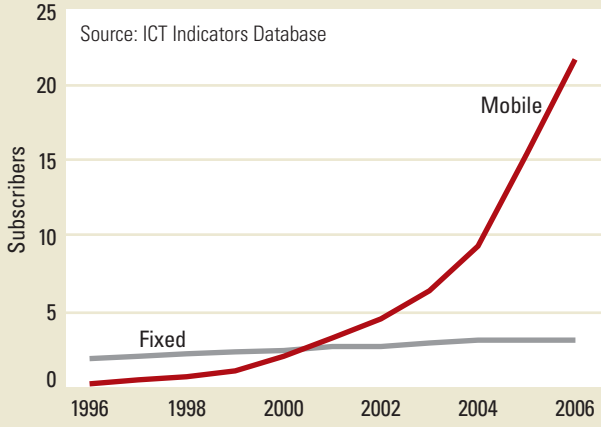
Through services like M-PESA, many mobile users who were previously "unbanked" or lacked access to money storage can begin to build personal economic security. While current mobile money services are focused on single-user account management or person-to-person transfers, plans are on the horizon at FrontlineSMS:Credit (an offshoot of the main software) to develop more nuanced mobile banking services. There is especially strong interest in providing microloans through mobiles in areas where microfinance has been successful. Ben Lyon, director of FrontlineSMS:Credit, describes its mission simply: "to bring formal financial services to the entrepreneurial poor in 160 characters (the length of an SMS) or less." Small is beautiful after all.

But why is SMS so great for all the poor and "unbanked," while a good chunk of the world is already upgrading to the next generation of iPhones and Droids? Forget loan repayments in 160 characters or less; the rich are shopping for all sorts of products on their handhelds, purchasing music, managing calendars and photos, and updating their status on multiple social-networking websites.

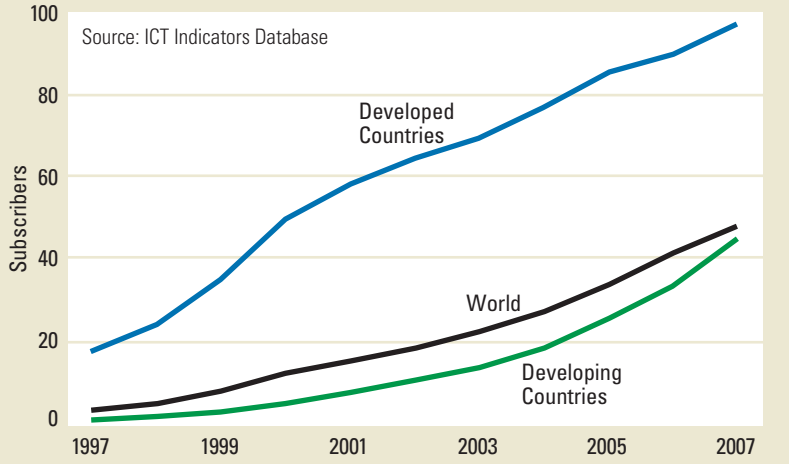
This is a classic appropriate-technology contrarian argument. Schumacher characterized the argument this way: "You are trying to withhold the best and make us put up with something inferior and outdated." But he refutes the complaint, saying that "it is not the voice of those with whom we are concerned… who have neither 'the best' nor 'second best.'" Those concerned desire the technologies that can reach the most people while still providing a technological upgrade and creating entrepreneurial opportunities. Mobile phones have done just that. The basic SMS-enabled phone has become cheap enough so that over half the world now possesses one and a great variety of enterprises has sprung up from their prevalence. FrontlineSMS alone has been downloaded by over 5,000 users looking to build SMS ventures.

In Argentina, where mobile usage has shot up from 17.5

Telephone Subscribers per 100 People, Africa, 1996–2006



Mobile Telephone Subscribers per 100 People, 1997–2007



subscribers per 100 people in 2002 to 102.2 subscribers per 100 in 2007, Jorge Luis Alonso has designed a process for small farmers to communicate with agricultural development organizations that help to market their goods. With aggregated crop information from an entire region, small farmers stand less chance of being ripped off by big buyers and can be alerted to crop diseases or approaching bad weather. Mr. Alonso is even working to include indigenous groups in the information-sharing network.

Another landmark mobile application was launched in Kenya during the country's troubled 2007 elections. The website ushahidi.com set up an SMS code and encouraged people to text in any reports of election-related violence, and include their location. Add in Google maps and some translation work, and Ushahidi was able to post a near-real-time geographic record of violent skirmishes along with commentary from those involved. Though this simple synergy delivered information around the globe, Kenya itself benefited from greater media coverage and law enforcement. Most recently Ushahidi has been applying similar techniques to aggregate, translate, and map SMS messages from Haitians following the January earthquake. The emergency response service carried out through mobiles after the quake was a striking display of how far and fast mobile-for-development has moved. Understanding how this service was orchestrated requires one final story about appropriate mobile technology.

Courtesy of kiwanja.net

All thumbs: SMS messaging in Uganda.

FrontlineSMS:Medic

A light bulb went on in Josh Nesbit's head during his first summer working at St. Gabriel's Hospital, a major provincial hospital in Malawi. He saw the regular trips hospital workers made over long distances, on foot or by bike, to check up on patients, as well as the piles of patient records, and thought it looked like a job for SMS. It's now been a year and a half since Nesbit helped St. Gabriel's and other surrounding clinics get mobile-enhanced services up and running. Nesbit reports that after only a day of training, a clinic's staff can manage FrontlineSMS software on their own, owing to their existing familiarity with SMS. St. Gabriel's and health clinics in 10 different countries are now coordinating patient appointments and home visits via SMS.

FrontlineSMS is not the first group to bring SMS to the medical field. Many healthcare workers were already doing some coordination using their mobiles. Other aid groups had come in with mobile technology as well. "But most of them were just there for data collection, gathering health statistics on the community," says Nesbit. In his view, introducing any technology "is all about the end-user. If you're going to use cell phones in the field, then use them to coordinate patient care and collect data while you're at it." The reason FrontlineSMS:Medic software catches on so quickly is that its main motive is to serve the clinics' needs and provide customizable functions.

Nesbit has seen firsthand how local initiatives and technologies often build on each other to create all-new ways of doing things. Health awareness information is often communicated in rural areas with a heavy reliance on diagrams, drawings, and pictures rather than written words. In Malawi, for example, there may be very little information published in the native language of Chewa, and pictures provide an easy way of identifying health symptoms. At one clinic, the health workers have developed a "symptom wheel" with which patients and community members can describe their conditions. Each

Vaughn Spethmann, www.abikes.org

Zambikes recently delivered Zambulances to the Malaria Consortium in eastern Zambia and urban clinics in Lusaka.

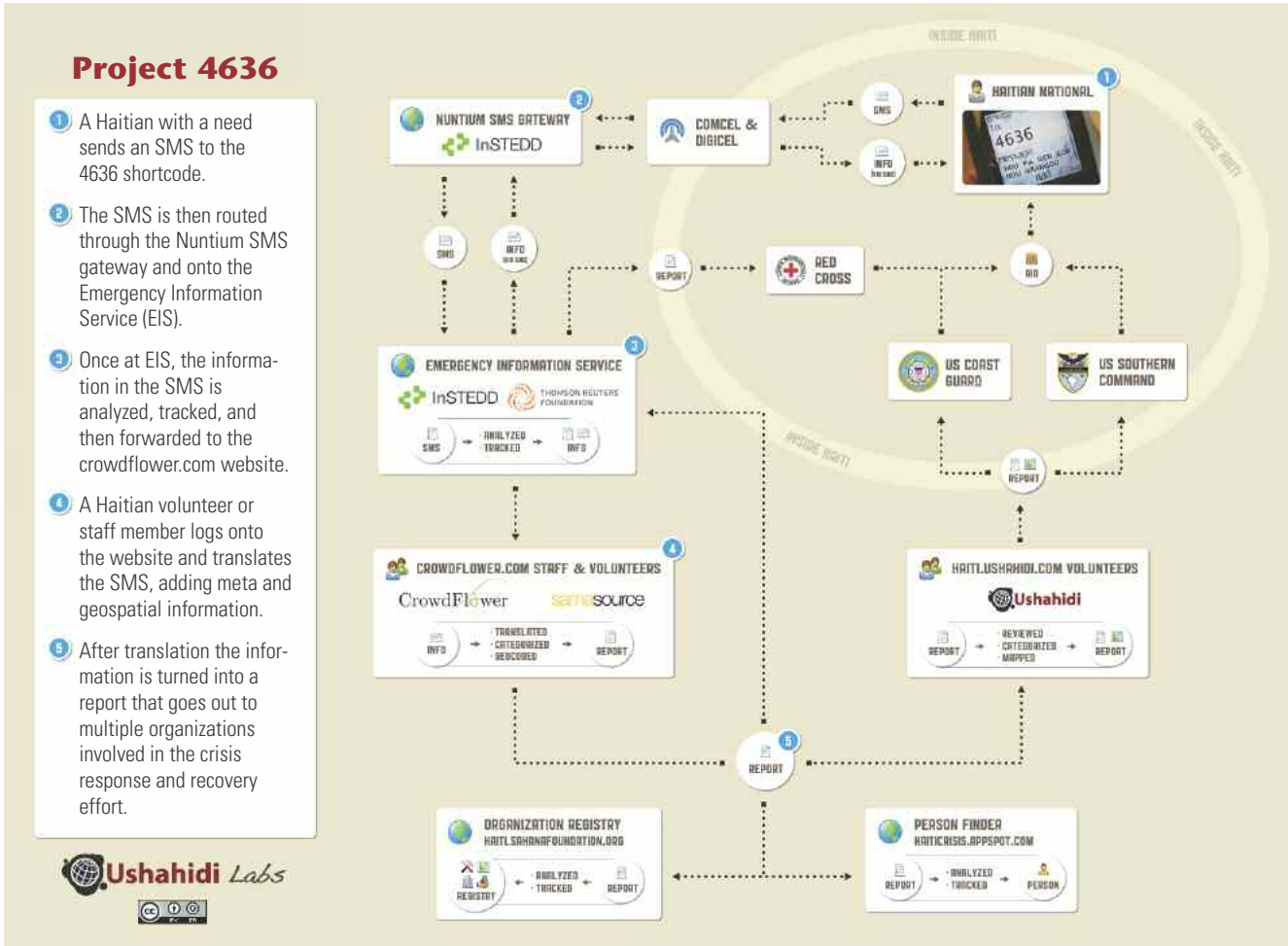
symptom on the wheel is assigned a code that can be sent by SMS and read into the system for diagnosis. Nesbit says similar systems have cropped up independently of each other. "At one clinic we had a board with pictures of symptoms," he says. "The patient points at the ones they have and that code is entered. Not as cool as a wheel, though."

The use of SMS exchange in rural health clinics has found synergy with other appropriate technologies as well. The use of bike ambulances—bikes fitted with a stabilized stretcher trailing the back wheel—is becoming more widespread in Africa. Not only are they affordable, but because bikes are so widely used, they can be ridden and repaired by locals. Zambikes, a Zambia-based manufacturer of bike ambulances, reports that they have distributed more than 600 bike ambulances ("Zambulances," as they call them) since beginning to manufacture them in 2007. Their goal is to produce and distribute 100,000 Zambulances in total. However, rural clinics still treat bike ambulances as a precious resource, so with SMS diagnosis they can use the ambulances wisely. When health workers have a clearer idea of the symptoms they are going out to treat, they can decide whether or not they have to take the bike ambulance along.

EARTHQUAKE RESPONSE

As soon as news of the Haiti earthquake reverberated through the world, a fast-acting group of mobile-application organizations came together to set up a communication portal especially for earthquake victims. Nesbit was almost immediately in contact with Digicel, Haiti's main mobile service provider, to see about setting up an SMS code that could be texted free of charge. Digicel provided 4636 to use as the emergency SMS number. Because cell phone towers were among the first pieces of infrastructure repaired in Haiti, this emergency texting line was up and running within four days of the quake. Incoming texts were then processed in Ushahidi fashion—each one translated into English, marked with a location on the map, and categorized as "actionable" or not. While haiti.ushahidi.com kept track of everything on a publicly viewable map, the aggregated reports were sent on to the first responders on the scene. In the meantime, word of the 4636 code spread quickly through Port-au-Prince. A month after the quake, a total of 38,000 texts had been sent in and 17,000 deemed "useful" for search and rescue teams and aid groups.

Several other mobile organizations added to this impres-



sive effort. InSTEDD (Innovative Support to Emergencies Diseases and Disasters), a group specializing in communications technology for disaster response, worked with Thomson-Reuters Foundation to set up an emergency information broadcasting system. Any phone number that sent an SMS to 4636 was immediately added to a database, so that organizations could then send out pertinent relief information to thousands of Haitians with operable mobile phones. This information included when and where supplies were delivered or transport out of Port-au-Prince was available. And a globe-spanning mass of volunteers mobilized on the Internet to translate incoming messages from Creole to English or to locate the origins of incoming messages on a map.

In the end, the mobile-phone earthquake response was largely orchestrated by U.S.-based organizations, and initially staffed by many a remote volunteer. So it can appear not to be the best fit for Schumacher's development prescription: maximize local labor, resources, and ideas. However, the folks at FrontlineSMS, Ushahidi, and other mobile-development leaders would argue that it was in fact each group's sense of appropriate technology that enabled the quick response. Their platforms encourage user creativity, as demonstrated by the thousands of applications that have cropped up around the world in banking, agriculture, health care, and disaster response. And just ask Josh Nesbit whether mobile phones are a *local* resource. "What has penetrated the market on its own?" he asks back. "It's not as helpful to think about why [mobile phones] are there, but to acknowledge their widespread use," and treat that as a resource. Ken Banks, possibly the world's leading voice in promoting mobile phones as an appropriate technology, puts it this way: "People that build and promote mobile technologies for developing regions just need to base their technology choice on what works—and what's available—in the places where those people live and work."

THE FUTURE OF MOBILE APPROPRIATE TECHNOLOGY

Mobile phones have certainly made it to the point of being a common resource worldwide. More than half of the world possesses or has access to a mobile phone with at least basic calling and SMS capabilities. Banks is now worried about the developing world being trapped in the basic-phone market with little attention given to bringing in broadband, Internet-connected phones in an appropriate and affordable way. Nokia recently announced the release of a $90 internet-enabled "smartphone" in its Indian markets, but Banks is not too impressed. He believes the devices can't really catch on until the price is down to $40 or so.

Were broadband mobile devices to become affordable in developing countries, those countries would surely do a technology leap-frog, skipping over the personal computer/stationary Internet phase and going straight to mobile. Such a leap could be a major equalizer of information opportunities across the world. Something like a FrontlineMMS (multimedia messaging service) could then be, yet again, developed to assist aid sectors such as health care, agriculture, and conservation.

Although *Small is Beautiful* was written over 30 years ago, the tenets of appropriate technology continue to guide many small-scale and mobile development projects. It's worth noting that E.F. Schumacher did deplore the spread of computers as a computational and educational tool. It bothered him that human intellectual capital could be replaced by machines. "The task of aid is to supply intellectual rather than material goods," he said. Yet with the span of mobile-based appropriate technologies before us today, we would have to ask Schumacher to reconsider his bias. Indeed, many of those technologies would not be around without experimentation and innovation from the developing world.

Courtesy of kiwanja.net

John Mulrow *is a MAP Sustainable Energy Fellow, conducting research for Worldwatch's Climate and Energy Program.*

A woodcarver in India pauses for a text message.

For more information about issues raised in this story, visit **www.worldwatch.org/ww/sms**.