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Mobile Technology and the Last Mile

"Reluctant Innovation" and FrontlineSMS

There are now more than five billion mobile phone connections worldwide, making them the most ubiquitous communications platform in human history. Communications technologies are unique among many other types of innovation in that they fundamentally change how we interact with each other. As mobile phones grow in sophistication and become smarter and smarter, many overlook the one basic piece of functionality that has done the most to change how we share information between one another: the text message. Text messages, or Short Message Service (SMS) messages which weigh in at 160 characters or less, don't, at first blush, seem obvious as a powerfully transformative technology. Yet, it is their simplicity, availability, and affordability that make them appealing to groups of people who have little experience with technology. The impact of SMS can be seen in almost every aspect of life, from teenagers' fragmented attention spans, to presidential campaigns, to the ways victims of natural disasters seek relief.

The use of mobile phones to improve systems and services, especially in underserved contexts—dubbed "mobile for development" (m4d)—represents one of the most rapidly growing frontiers in innovation, particularly in the developing world. FrontlineSMS is an open-source SMS gateway that enables grassroots organizations to use text messages and mobile technologies effectively to serve their communities. Over the last six years, FrontlineSMS has been downloaded more than

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14,000 times and is being used in a wide variety of settings in over 70 countries.

The increasing adoption of the mobile phone, and SMS specifically, is creating something that never existed before for hundreds of millions of people: access to information. The number of mobile connections is expected to rise to six billion by 2012[1]—explosive and unprecedented growth, considering that there were only 720,000 in 2000.[2] SMS, in particular, is unique because it is a function of nearly all of the world's mobile phones, making it one of the few standard applications in an increasingly fragmented market. The mobile phone industry has accomplished such growth in part by recognizing the potential in untapped, low-resource markets. Both device manufacturers and service providers have driven global adoption by designing and marketing low-cost offerings. For example, Jan Chipchase, formerly chief usability researcher at Nokia and now executive creative director of Global Insights at Frog Design, spent years living with and researching remote communities in order to determine what features would maximize value for phone users. This type of research can be very powerful and result in the development of phones such as the Nokia 1100, which costs under $20 and has sold over 700 million units worldwide. By recognizing the potential of underserved markets and gearing its offerings to them, the mobile industry has both profited from and, in many places, introduced the standards of locally appropriate technologies.

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The m4d field is largely based on the same theory: that new communications technologies, where designed for and integrated into local systems, have great potential to improve, well, everything. It's important to clarify that the idea of local appropriateness as it relates to m4d spans a range of factors, including obvious things like communications infrastructure, phone ownership, hardware compatibility, and affordable services. The concept, however, also includes a range of less considered but equally determinative factors, such as timing, textual and technological literacy, power infrastructures, cultural context, gender, communications workflows, marketing, and local capacity. In many m4d projects, the technology itself is new but some of the mistakes are uncomfortably familiar struggles in international development: top-down projects that lack understanding or appreciation of the end users. Mobile integration and m4d projects must prioritize the implementation context in order to meet the needs of both the users of the technology and the people they seek to serve.

Mobile communications technologies, and specifically SMS, implicitly reduce a number of barriers to communication. Perhaps most importantly, mobile

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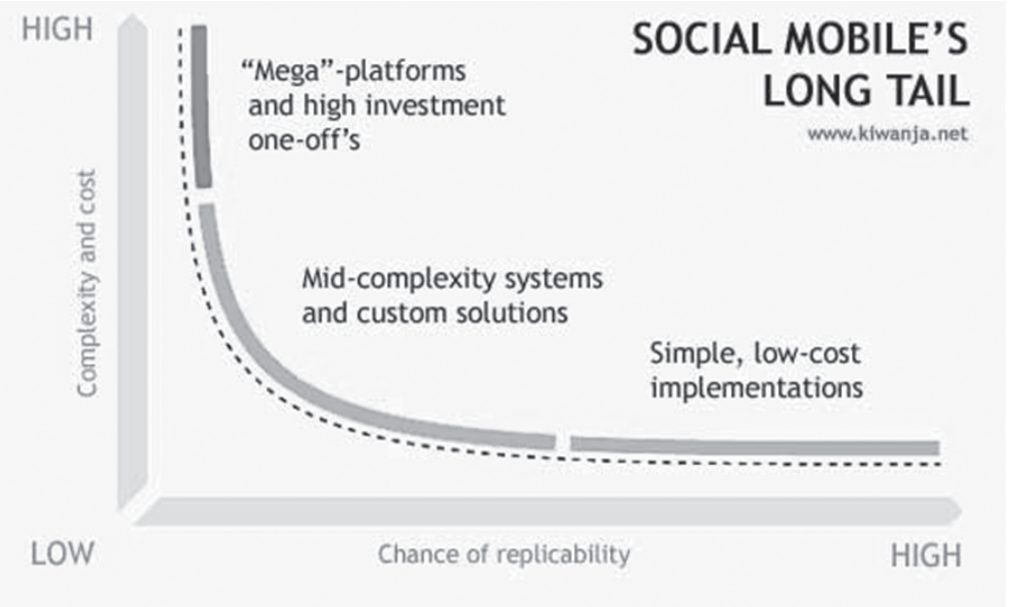

Figure 1. Social Mobile's Long Tail

phones are comparatively affordable—both the phones themselves and their service packages. SMS, unlike the mobile web or downloadable applications, requires only a mobile signal, and because it is text based, it enables the creation of complex records and data entry anywhere you can take a mobile phone. This ability to bridge distance is a large benefit of structured SMS communications, especially in rural or underserved communities that have never had access to other people, let alone government or nonprofit services. In addition, because the information is digital, simple software programs such as FrontlineSMS can use SMS to structure inputs and automate responses and workflows. These programs often significantly reduce the human resource costs of communication by allowing one-to-many, automated, and asynchronous responses.

Mobile communications tools have the potential to reduce the impact of many problems when they are sufficiently tailored, but they are rarely the only element of a wider solution. Many ambitious m4d projects fall apart because they fail to recognize that the people closest to a problem are the most likely to figure out the best solution. Given the many challenges in m4d projects, ranging from infrastructure to education to organizational change, it is important that the tools involved be extremely flexible, lightweight, and approachable.

A helpful conceptual tool that can be used to analyze the different approaches to m4d projects is the "long tail" of social and mobile innovation. The long-tail concept was first talked about by writer Chris Anderson in a *Wired* magazine article, where he used it to describe consumer demographics in business.[3] When Ken Banks first applied it to the mobile space in January 2008, the resulting "social mobile long tail" was something quite distinct from the original concept, as you

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can see in the image above. The long tail illustrates the tension between highly complex, expensive technologies and the likelihood that a broad range of organizations will be able to use them. The standard of replicability can be quite difficult to attain, especially when targeting grassroots organizations in under resourced or "last mile" environments. Yet, if we're honest about who is best suited to solve a community's problems, these are the people that are most likely to drive successful, sustainable solutions.

At the top of the image there are high-end, high-cost solutions running SMS services across national or international borders, with little chance of being replicated for average grassroots NGO. These are the tools that generally get the greatest amount of exposure for their technical sophistication. Then there are lower-cost, custom solutions, developed by individual (often mid-level) non-profits to solve a particular problem in a particular country or region, or to run a specific campaign. These have a better chance of being replicated for grassroots NGOs. These tools generally get a medium to high level of publicity.

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Finally, the long tail itself describes the simple, low-tech solutions whose simplicity and affordability increase the likelihood of replicability among grassroots NGOs. These solutions are generally designed to work on simple hardware and locally available infrastructure, in order to reduce costs. They are designed to have very approachable user interfaces and be highly customizable, while still offering sophisticated functionality. Long tail tools are designed to be available to the people who drive the long tail design philosophy, who have been called "reluctant innovators."[4]

Reluctant innovators are people who set out to solve a single urgent problem in their own contexts, instead of setting out to drive systematic change through technology. Examples are healthcare workers who travel huge distances to connect their communities to clinics, or farmers who find new ways to make crops more resilient. Many people finding everyday solutions to everyday problems can be referred to as reluctant innovators; the term refers to regular people who find themselves faced with a challenge, and who decide not to turn their backs but to take it on. These are the people who most need tools that work.

In fact, FrontlineSMS itself owes its existence to "reluctant" innovation. The original FrontlineSMS software was born out of conservation work in Bushbuckridge, in Kruger National Park, South Africa. While trying to identify a system that the South African National Parks could use to communicate with Bushbuckridge community members, workers discovered the need for a new solu-

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tion. The authorities wanted to re-engage people in the conservation effort, keep them updated on park matters, ask their opinions on important decisions, arrange meetings, and send wildlife alerts. After a considerable search for a solution, all that could be found were Web-based mass messaging tools. Back in 2004, it wasn't possible to just jump on the Internet while in Kruger National Park, so all of these solutions proved totally inappropriate.

It was from this experience that the need emerged to create a system that could send, receive, and organize text messages through a mobile device and a laptop, thus removing the need for the Internet. After raising a small amount of money, buying some manuals and simple hardware, and spending five weeks over a kitchen table in Finland, Ken Banks wrote a prototype of FrontlineSMS during the summer of 2005. FrontlineSMS is a piece of software that uses widely available technology—a cheap laptop along with a mobile phone or GSM modem—to create a mass messaging system. Although FrontlineSMS was designed to solve a specific challenge in a particular context, it soon became apparent that this tool had great potential to be successfully replicated in many others.

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While mobile and Internet coverage continues to increase rapidly, the high costs of personal computers, infrastructure, and pricing plans suggest that affordable Internet access is still years away in many areas of the world. FrontlineSMS is designed to bring the benefits of simple digital communication to parts of the world with only a GSM signal, mainly, the poor remote regions where other tools don't reach. The software was made available in October 2005, and has remained open source and freely available to download.

In 2008, a group of volunteers provided a great example of how FrontlineSMS was able to bridge communication gaps to significantly augment the work of community healthcare workers in rural Malawi. With a population of approximately 14 million, Malawi has only 1.1 doctors and 56.4 nurses per 100,000 people, so medical services and resources are spread very thin. Recognizing these problems while volunteering at St. Gabriel's Hospital, a network that serves more than 250,000 patients, this group brought cheap accessible phones, a laptop, and a modem. The volunteers gave 75 community health workers mobile phones to support their work over an area 200 miles in diameter. These community health workers used the phones to send appointment reminders, status updates, and medical reports from the field. The efficiency savings demonstrated by this project were huge. Health reports were delivered by SMS rather than by hand, saving 900 hours of transportation time; net fuel savings on transport alone amounted to $2,750 in

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just six months.[5] The team that ran this pilot has been so successful in using FrontlineSMS that they formed their own organization, FrontlineSMS:Medic (now Medic Mobile), and they use mobile tools to improve health outcomes in more than 10 countries.

Other reluctant innovators have used FrontlineSMS to tackle challenges in a broad range of contexts across the world. In Banda Aceh, Indonesia, FrontlineSMS powers a fish-marketing system that allows fishermen to make informed decisions about where to sell their catch, regularizing fish prices and producer incomes across the project area. In Nigeria, Burundi, and the Philippines, the software has been used to help monitor national elections. In Uganda, it is used in a nationwide agricultural extension and knowledge-sharing system. The software has been used extensively as an information service for human rights organizations, such as the Zimbabwean civil society organization Kubatana.net. In Egypt, an organization called HarassMap has used FrontlineSMS to collect reports of harassment via SMS, recording them via the crowd-sourced mapping system Ushahidi. These are just a few examples that demonstrate the sheer variety of ways FrontlineSMS is being implemented to help empower people across the world.

FrontlineSMS continues to develop and adapt mobile technology solutions to an increasingly complex array of development contexts. We have developed five distinct projects to address the unique challenges that underserved populations face in accessing medicine, banking, legal services, education, and local media. Our aim and focus continue to be small organizations that meet the challenges of their underserved communities. We at FrontlineSMS not only admit, but celebrate, that it is this incredible group of people who continue to drive both the development and innovation around m4d. We are honored to have the privilege of supporting them. And we're not at all reluctant about that.

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