

Identifying the Building Blocks for Sustainable and Scalable mHealth Programs

Success can beget success in the field of mHealth if organizations enhance their opportunity to drive successful outcomes by learning from similar projects taking place within the mHealth 'ecosystem.' This section identifies mHealth projects that embody practices of highly scalable and sustainable mHealth programs. The case studies reveal some of the key benefits of mHealth, and provide examples of how to structure successful mHealth initiatives. These case studies also reflect the field's dynamism, as each was implemented within the 12 months prior to the publication of this report.

Key Building Blocks for Success

As a young field, mHealth is well positioned to benefit from best practices and available technology documented in early project reports. The case studies of mHealth projects and input from industry experts reveal common practices that collectively form the building blocks for success in this young, dynamic field.

Forge strong partnerships

Partners from multiple sectors bring diverse strengths to the project. Ensuring that each partner advances its organizational goals through the project paves the way for successful future collaborations.

Be accessible

Communication is more effective when tailored to specific social, ethnic, and demographic groups. Colloquial language and references to pop culture may be effective in reaching teenagers, while older populations may prefer a more formal approach.

Design with the end user in mind and maintain a focus on usability

Applications and devices must take the users work environment into account in the design phase. In the mHealth environment, ease of use is essential.

Build a long-term funding plan

Continuing the project beyond the initial seed funding can be accomplished by aligning with long-term national health goals. Integration with the national health care program of the country of operation is essential.

Set measurable goals

By setting interim goals and benchmarks, mHealth projects can provide proof of success, allowing them to secure support and funding for expansion. Setting measurable goals also helps project principals to identify the need to quickly correct a particular course of action in the event that interim targets are not met.

Collaborate with other mHealth organizations

With dozens of projects currently operating, the mHealth field is now in a strong position to move forward by sharing techniques and applications. Organizations such as the Open Mobile Consortium are facilitating the ability of the field to move forward by sharing best practices.



Credit: DataDyne

Project Masiluleke

Country: South Africa

Sponsoring Organization and Partners:

Pop!Tech Accelerator, Praekelt Foundation, iTeach, frog design, MTN, Nokia Siemens Networks, National AIDS Helpline, National Geographic Society, Ghetto Ruff Records, Children of South African Legacies, Aricent

The Project

Incubated by the Pop!Tech Accelerator, Project Masiluleke is designed to harness the power of mobile technology as a high-impact, low-cost tool in the fight against HIV/AIDS. Under the guidance of an international, multidisciplinary team, the project provides a suite of interventions targeting the entire HIV/AIDS care continuum by promoting testing, treatment connection/adherence and, ultimately, improved access to testing via an innovative home HIV test kit supported by mobile counseling.

Project Masiluleke is currently sending one million text messages per day throughout South Africa that encourage people to be tested and treated for HIV/AIDS. By capitalizing on the ubiquity of mobile devices in even the most resource constrained areas, this project has the potential to revolutionize the public health response to HIV/AIDS in South Africa and other parts of the globe. The model is designed for scale and replication and can be modified to address a variety of public health and social challenges.

Messages are written in local languages, and are used to direct recipients to the National AIDS Helpline. Once patients have called, representatives of the hotline provide information about testing services and locations.

Be Accessible

With many countries having multiple local and regional languages, communicating with people in the language they know best is critical. Similarly, it is essential to understand the target demographic. Colloquial language and references to pop culture may be effective in reaching teenagers, while older populations may prefer a more formal approach.

Objectives and Results

Project Masiluleke is designed to make more people aware of their HIV status because in South Africa, one-quarter of the population is estimated to be infected with HIV, but less than 3% know their status. The broader goal of the program is to have those infected receive treatment and to halt the spread of the disease. Initial results from a beta test of the project indicated that it helped to nearly triple call volume to the helpline in the three weeks during which it ran. The project partners are building in rigorous monitoring and evaluation of the project by, for example, linking calls to the helpline to PCM text messages through the use of distinct phone numbers that allow organizers to verify the number of calls generated by the program. Once the project is operating successfully, the system will be expanded to provide information about TB resources and treatment.

Future Plans and Scaling Challenges

The next phases of the project will be the use and extension of the Praekelt Foundation's TxtAlert program to remind HIV-positive patients to take their medication and keep medical appointments; the creation of 'virtual' call centers staffed by highly adherent patients; and the deployment of easy-to-use home HIV test kits, as the social stigma attached to HIV often prevents people from going to public clinics for testing.

Challenges remain for scaling projects like Masiluleke. Working across multiple networks, developing relevant messaging, and catalyzing resources to take the initiative to scale are all difficult, according to Robin Miller of Praekelt Foundation. Yet the project's early achievements point to some factors that increase the likelihood of success. Miller says that several ingredients have been critical for success:

- Ensuring strong local partners to develop relevant content. Masiluleke's partners enable the organization to tap into an already established customer base and also leverage their knowledge to build valuable content.
- Method of interacting with the intended audience. "We have found that mobile phone innovations already exist, even without new applications. For example, sending 'missed calls' led to the creation of the PCM message which was the starting point for the project."
- Scaling and progress are only possible through rigorous data collection and analysis. Only through measurement can we know what is working and where redirection is needed.



GEORGE MASEBE HOSPITAL

Credit: Vital Wave Consulting



Credit: UN Mark Garten

Multiple Health Issues Addressed by SMS Campaigns

Netcare Vodacom Smile for You Campaign—Hundreds of thousands of children in the developing world are afflicted with the condition known as cleft lip and palate, a relatively common birth defect that is all but invisible in rich countries where surgery to correct it is widely available and affordable. Children who are not able to have this condition remedied through surgery often have eating and speech difficulties and face social discrimination. In 2007, the Netcare Group, a private medical hospital group in South Africa, and Vodacom teamed with the Praekelt Foundation to offer 50 free cleft lip and palate surgeries to children too poor to afford them. A previous campaign to raise awareness of this service had relied on traditional media such as print and radio but yielded disappointing results, with only about 12 candidates identified for the surgery.

For the Smile for You campaign, the sponsors shifted to a mobile technology solution to improve response levels. In South Africa, 'Please Call Me' (PCM) text messages, which mobile phone users can send for free with a request to the sender to call, have become an enormously popular service, and operators subsidize them through the sale of advertising space in the unused character space of the text message. Over the course of five days, Vodacom donated space in one million PCM text messages for a message asking recipients if they knew of children in need of free cleft lip and palate surgery, using Praekelt's SocialTxt technology (also used in HIV/AIDS outreach efforts). During the first two days, recipients who wanted more information were prompted to phone a call center manned by Netcare staff. Beginning on the third day, recipients were given the option of sending an SMS with the word 'SMILE' to the Netcare call center, whereupon a representative would phone them to provide further information about the surgery offer (resulting in a lower cost to the message recipient).

The results of the campaign demonstrated the effectiveness of this concept. **Calls made to the call center, which hovered in the single digits in the weeks before and after the campaign, averaged nearly 35 per day, while staff received over 355 text messages during the three days that responding via text message was an option. In all, 42 children were identified as surgery candidates, more than three times the number identified during a traditional media campaign lasting six weeks.** The sponsors note that 203 people who did not know anyone with a cleft lip or palate responded, indicating that broadening the campaign to include languages other than English might yield even more promising results.

According to the Praekelt Foundation, several factors were essential to the campaign's success. All of the partners involved in the project brought strengths to it, as well as a desire to rigorously track results. The willingness to change tactics in the middle of the campaign also allowed the sponsors to compare communication methods in order to determine what was likely to work in future campaigns. And perhaps most critically, the partners leveraged the popularity of PCM messages and the experience Praekelt had accumulated in previous campaigns using SocialTxt software.

Text to Change (TTC)

Country: Uganda

Sponsoring Organization and Partners:

Celtel, AIDs Information Centre (AIC), Merck, and the Dutch Ministry of Foreign Affairs



Spread the message stop the virus

The Project

Text to Change (TTC) provided HIV/AIDS awareness via an SMS-based quiz to 15,000 mobile phone subscribers during three months in Uganda. TTC was founded with the goal of improving health education through the use of text messaging, which holds the advantages of anonymity and strong uptake among the population. Partnering with the mobile carrier Celtel and the local NGO AIDS Information Centre (AIC), TTC conducted a pilot program from February through April 2008 in the Mbarra region of Uganda, with the objective of increasing public knowledge of and changing behavior around AIDS. The program aimed to encourage citizens to seek voluntary testing and counseling for HIV/AIDS.

An SMS-based multiple choice quiz was administered to 15,000 Celtel mobile phone subscribers in the rural region of Mbarra. Free airtime was offered to users to encourage participation in the program; this was determined to be a powerful incentive since users can exchange the airtime with other subscribers as a type of currency.

The quiz was interactive. When participants gave a wrong answer they received an SMS with the correct answer from the cell phone provider. The uptake rate of the survey was 17.4% and focused on two specific public health areas:

- General knowledge about HIV transmission
- The benefits of voluntary testing and counseling

At the end of the quiz, a final SMS was sent to motivate participants to go for voluntary testing and counseling at the local health center. Those who went to the center were asked a final question: Was this was the first time they had an HIV test? After testing, participants were requested to leave their mobile phone number so that post-test counseling could be arranged. For the people who came to the health centers through TTC, HIV testing and counseling was free of charge. Initial grants from Merck, the US pharmaceutical company, and the Dutch Ministry of Foreign Affairs supported the program launch.

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Forge Strong Partnerships

Successful mHealth projects require the participation of partners with expertise in the fields of technology, healthcare, and academia. Validation and testing are key steps in the conception of mHealth programs and this phase typically occurs within a university setting or a technical organization. In order to move to the implementation stage, however, it is essential to bring other partners into the project. Dr. Patricia Mechael of the Earth Institute notes that “The projects that have been implemented at significant scale have forged strong partnerships, either with a government or a private corporation.” Mechael further affirms that the mHealth field currently finds itself in a place where a number of projects are in the design and testing phase that have not yet made the move to implementation. “As the diverse sectors involved in mHealth continue to collaborate and the corporate and political climate become more supportive we expect to see more projects move into the implementation phase.”

Set Measurable Goals

As with any initiative, setting measurable goals establishes the barometer that allows mHealth projects to assess success or failure. It builds in the rigor that is required if course corrections are needed during the project. Once achieved, these goals, in turn, form the building blocks for success, allowing the project to move forward with larger implementations and broader partnerships.



The quiz produced a 40% increase in patients who came in for testing—from 1,000 to 1,400 during a six-week period.

Objectives and Results

The quiz had two goals:

- Collect information. In particular, the program was able to assess the rate of correct or incorrect answers within certain socio-economic sectors, and pass this information along to UNICEF.
- Promote testing and counseling. The quiz notified participants of the location of the nearest testing center. If they stated that they were referred from the quiz, testing was free (there was normally a small charge for testing).

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In terms of information gathering, a key finding of the survey was that although people were quite knowledgeable about issues such as condom use, they did not think that AIDS testing was accurate or anonymous. This was a major finding, in that the population of Uganda had not been surveyed on this question before. TTC was able to pass this along to larger health agencies operating in the region, thereby contributing to the efficacy of existing health programs.

TTC co-founder Hajo van Beijma notes that “there was initially an element of risk for the funders since this type of project had not been conducted before, but now that we have proven results we have the opportunity to expand.” TTC is planning a follow-up program in Uganda in January 2009. One of the goals of this next campaign is to promote the safety and effectiveness of the testing center, and therefore specifically encourage testing.

In this phase, collaboration with local partners will be further strengthened, with the local HIV/AIDS organizations submitting questions. Text to Change intends to shorten the duration of the program to four weeks, hoping to minimize participant drop-out rates, and to include non-English speaking subscribers by enabling them to read SMS messages in their local languages.

The pilot saw the sponsoring partners benefit as well: Celtel (now rebranded Zain) reaps benefits not only from a corporate social responsibility (CSR) perspective but also through the promotion of its texting service. The testing center increased the number of tests conducted, placing them in a position to receive expanded funding.

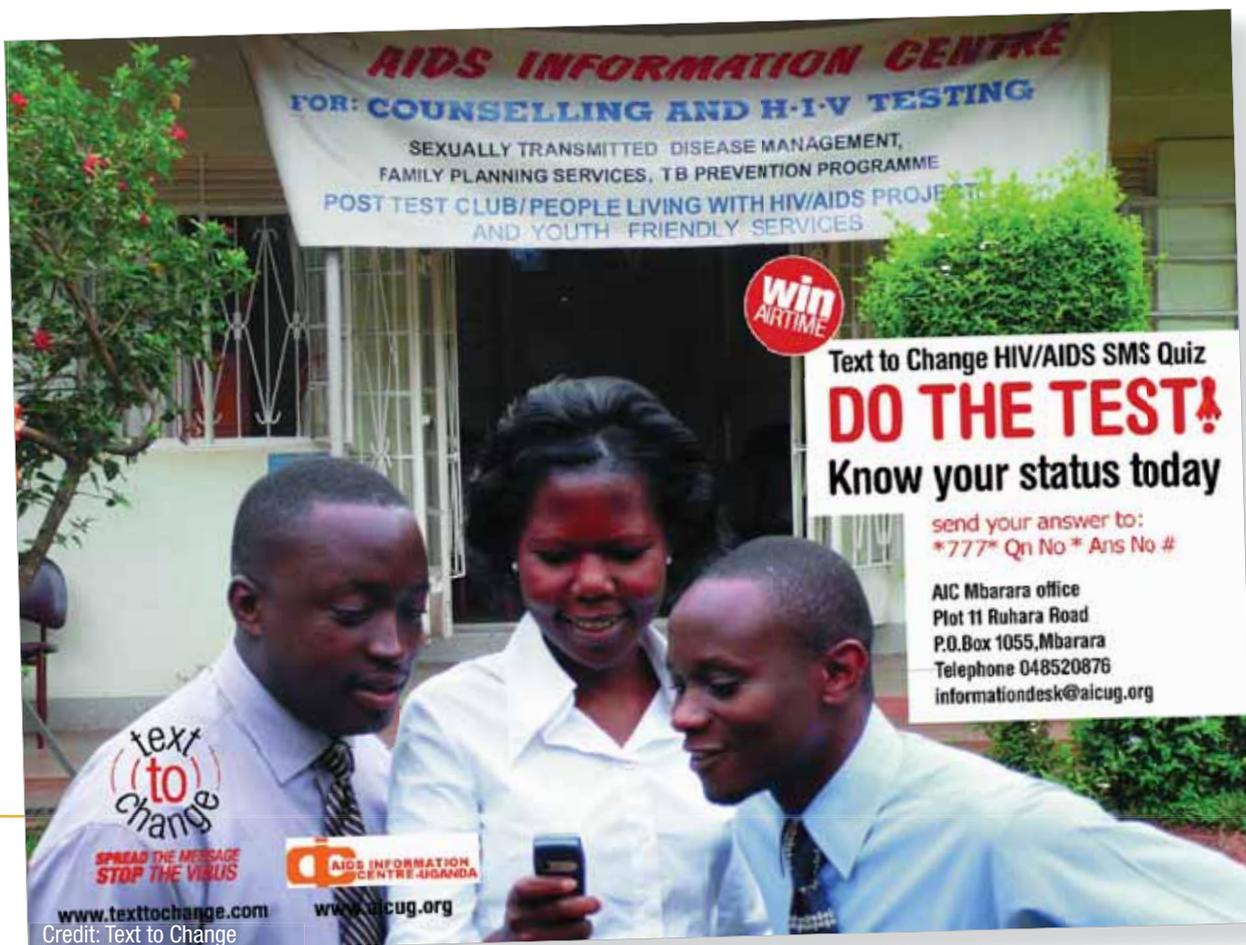
Future Plans and Scaling Challenges

Hajo van Beijma hopes to build upon lessons learned from the pilot. He comments, “After the pilot we saw that our initial program didn’t have a good survey running. In the second round we developed a new survey with Ugandans, and used university students. Their IT knowledge is fabulous. They really know how to program these kinds of software tools in Uganda.”

The new program in January 2009 will target 30,000 people, and ultimately TTC plans to do a nationwide roll-out. Van Beijma notes, “If we are able to prove that we can send out a large number of questions, that will lay the groundwork for the nationwide program. In the first pilot there were some issues with being able to send out a large number of questions at the same time.”

Van Beijma cites several critical success factors for scaling Text to Change and similar mHealth projects. These include:

- Develop surveys in the numerous local languages. This would make their message more accessible to specific ethnic and social groups. Literacy is also an issue. However, van Beijma notes, “If people do not speak or read English and they get a text message they will ask their neighbor what it means.”
- Secure ongoing funding. Though TTC is more cost effective than many other education programs, steady funding will allow for stable operations and growth.
- Collaborate with other mHealth organizations. Van Beijma notes that one of the consensus findings of the recent MobileActive conference in South Africa (October, 2008) is the need to set up a consortium to promote collaboration among mHealth organizations in different developing countries. “The goal is to work with organizations that are doing similar and complementary things in different countries. This way if we move into other countries we will combine strengths, for example, by developing software together.”



Data Gathering

Country: Brazil

Sponsoring Organization and Partners:
Nokia, Amazonas State Health Ministry

The Project

In the Amazonas state of Brazil, containing dengue fever is a constant challenge due to heavy rainfall during most of the year, and local methods for storing water in homes—both of which have been shown to promote mosquito breeding. The state health department must warn households constantly about the dangers of behaviors that encourage mosquito proliferation. Despite these difficulties, the state is one of the most efficient at containing the spread of the virus relative to other states in Brazil, due partly to its partnership with Nokia on the Data Gathering mHealth initiative.

The Nokia Data Gathering system enables fast and effective data collection, which is essential to containing the spread of the dengue virus. Development of the software began in the first quarter of 2007 and it was piloted in different regions of Brazil during that same year. The Amazonas Health Department undertook the first full implementation of the solution, which began in October 2008.

Data Gathering allows the creation of customized questionnaires, which are distributed to the mobile phones of health agents in the field. When the field workers finish their surveys, they send the data back to the server via a wireless connection, from which it can be integrated into the organization's existing systems for immediate analysis. Data Gathering also provides GPS location information for each record, which would otherwise require dedicated instruments.

Users report the tool is flexible and easy to use. As Luzia de Melo Mustafa, an Amazonas health agent, affirms, "It's easier, quicker and more practical. You type it and send it right away, it goes straight to the server. Then the data is consolidated and we can get the result immediately and, consequently, we may take the right actions, what we need to do. The devices are providing us with precision; the information we need to develop [effective responses] in the areas where the infection levels are high."

Objectives and Results

The goals of the project are all about saving time to save lives. Andre, project principal, states "The initial impetus for the project started with a meeting in Brasilia with the federal Ministry of Health where we tried to find a way to use mobile technology to improve current health data surveys being conducted using pen and paper. There was a real need to make the process more agile and more reliable, providing the government with a tool that could ultimately save lives through the use of smartphones."

Results of Data Gathering implementation to date are highly encouraging. The project team's preliminary evaluation has shown that the time spent in data gathering was drastically reduced, and end-user acceptability has been very high so far. Even before the full implementation, more than 400 results were gathered during the tests by a team of 20 field professionals in the course of two days, all with GPS information. Luzia de Melo confirms, "Before we used to wait for one or two months before we could get all the consolidated information. Now, we have it on a daily basis." As Greg Elphinston, Community Involvement Director for Nokia, elaborates, "If you have to wait two to three months for information in the health context, this can be the difference between life and death."

"In order to stop an outbreak and the means of disease transfer, we need to have the information very fast. That's the only way to prevent the virus of dengue from circulating."

—Luzia de Melo Mustafa,
Health Agent coordinator, Amazonas Brazil

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Future Plans

Plans for expansion will be based on a comprehensive evaluation of current work. The immediate growth objective is to broaden the covered areas in the Amazonas state, as well as adding yellow fever and malaria to the list of diseases to be surveyed.

Project staff cite several critical success factors for Data Gathering and similar projects, including:

- Work closely with local and regional government agencies. The service must respond to the local needs as perceived by local officials. Their support for the project will make implementation and expansion possible.
- Maintain a focus on usability. According to Andre Erthal, Head of Community Group at the Nokia Technology Institute, “If the field agents do not see the device as part of their work or have difficulties in using it, it may severely damage the overall success of the implementation. That is one of the reasons why the solution was developed since the beginning with the end user in mind, so we could develop the solution to be as user-friendly as possible.”
- Working in partnership with Nokia, Pan American Health Organization (PAHO), and National Foundation for Indigenous Peoples’ Health (FUNASA), the UNF-VF Technology Partnership will be launching a program called Mobisus in Brazil in 2009, utilizing mobile phones for health data gathering.¹³

Design With the End User in Mind

“End-user acceptance is one of the critical success factors for the project. If the field agents do not see the device as part of their work or have difficulties in using it, it may severely damage the overall success of the implementation. That is one of the reasons why the solution was developed since the beginning with the end user in mind, so we could develop the solution to be as user-friendly as possible.”

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Head of Community Group, Nokia Technology Institute

Government Support is Critical for Long-term Success

The majority of mHealth projects are implemented with seed funding from philanthropic organizations such as foundations and multilateral institutions, or as part of a corporate social responsibility initiative by a for-profit business. The three case studies highlighted in this report provide proof of concept, and initial positive results. However, all too often, once the initial funding has been exhausted the projects find it difficult to achieve scalability and sustainability, resulting in unintended termination. Ensuring long-term sustainability is a major challenge for mHealth projects.

Expert researchers in the public health and eHealth arena are currently examining the sources of sustainability for mHealth projects. In particular, Dr. Adesina Iluyemi, a PhD Candidate at the University of Portsmouth, United Kingdom focusing on sustainable mHealth in developing countries, has noted that mHealth projects are far more likely to be sustainable in cases where buy-in from governmental or public bodies is secured. In this way, the project is institutionalized into existing government health programs and can receive budget attention.

Dr. Iluyemi notes, “It is very important that a mHealth project have the support of the national or regional government. The majority of mHealth projects are currently funded by international agencies or CSR initiatives of companies. The problem is when the funding runs dry there is no more continuity. In the long term the custodian of the project will be the government. This could be national, local, or regional. During the lifetime of the pilot project it is very important to ensure that the government buys in and that the government sees the benefit so that the project can survive beyond the donor-funded period.” For every mHealth project, therefore, it is critical to ensure that the program is aligned with the strategic goals of the national health system.

¹³ <http://commitments.clintonglobalinitiative.org/projects.htm?mode=view&rid=211710>.

Open Source Movement: A Building Block for mHealth Success

A component of sustainability for mHealth programs is building capacity to enable programs to be locally implemented and maintained. The most successful mHealth projects have obviated the need for external consultants and achieved technical self-sufficiency. For many organizations, open source software is a tool for self-sufficiency, as it reduces costs, increases the available pool of programmers, and eliminates the need for outside consultants. It also encourages innovation.

Software development costs can be reduced with open source software because there is no need to purchase licenses. Because local programmers in developing countries are increasingly being trained in open source software, self-sufficiency is promoted. According to Dr. Balcha Masresha of the WHO, open source software is a key variable in the ability of EpiSurveyor, a PDA-based data collection project, to be sustainable and scale up to 20 countries in sub-Saharan Africa. "It is crucial for this kind of project because of existing longstanding experience with the EPIINFO software (freeware developed by the Centers for Disease Control) used in nearly all countries for the management of immunization and surveillance databases and analysis, and because of the inhibitive costs involved in the purchase of proprietary software for the average African user."

As Eduardo Jezierski, Vice President of Engineering at InSTEDD states, "Open source allows different projects to 'talk' to each other. In this way we can pool our very limited engineering resources and say 'here's the source code, can you help me with this.' It is allowing us to create a platform that costs less money from a licensing perspective for the countries running mHealth programs." Jezierski further notes that "This industry is at an early stage, and it is very encouraging that people are learning from each other and are sharing source code. It is very rare that an industry starts with this sort of collaboration."

Collaborations of this nature are steadily emerging in the mHealth arena—witness the 'Open Mobile' Consortium, which was conceived at the MobileActive08 conference in Johannesburg, South Africa in October 2008 and began to take shape in a series of meetings in New York the following month. The organization will focus on developing best practices and standards for the mHealth field. Organizations of this type will pave the way for coordinating the various components of mHealth on a grander scale, bringing the industry to a higher stage of evolution. ■

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OpenROSA

With so many community-based organizations involved in creating mHealth applications and a need for both customization and standardization, it is not surprising that many applications are created in an open source framework. With this in mind, a coalition of community health organizations and health researchers created OpenROSA in 2007. OpenROSA is a consortium that develops "open source, standards-based tools for mobile data collection, aggregation, analysis, and reporting." With university partners in the United States providing technical expertise and community health professionals in Africa testing and deploying mobile applications in the field, multiple organizations are able to share their ideas, data, code, and experiences.

As part of this effort, OpenROSA is currently developing JavaROSA, a J2ME implementation intended to run on mobile phones and PDAs. One of the programs using this architecture is CommCare, which is being tested in Tanzania and Uganda by community health workers collecting health data in rural areas. The program was designed to maximize patient data security while remaining simple for workers to use, a difficult balancing act. Participants in the project hope that as CommCare is deployed, it will not only provide better data and improved patient care and service where it is used, but that the lessons from field experience will help perfect the architecture for future projects.