

# OpenROSA Meeting 2009

Report on the 4th OpenROSA, July 20-23, Dar es Salaam, Tanzania

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**Abstract:**

This report describes the fourth meeting of the OpenROSA Consortium, held in Tanzania in July 2009. OpenROSA is a consortium of organizations working together on solutions and standards for mobile data collection and decision support, with a strong emphasis on health applications in low and middle income countries. The meeting emphasized networking opportunities, training for people new to the consortium and projects, and a time for the core coders to meet and resolve open issues around the code base. There was a tremendous mood of excitement, productivity, and fun in the meeting and many new collaborations were begun. The meeting met and exceeded most of its objectives, though there is still need for more coordination of how OpenROSA should fit into the increasingly active space of mobile health applications and organizations.

**Keywords:** mobile health, electronic health, data collection, handheld, phones, ICTD, Tanzania, OpenROSA.

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## Rationale and Background

Mobile technologies have a tremendous potential to contribute to addressing global health inequities. Given the growing number of mobile handsets in low- and middle-income countries, there is an urgent need for a variety of tools that address the lack of information and evidence regarding health for decision making and research at all levels of the health and other sectors. Due to recent technological advancements, there is great excitement for using mobile phones to address current gaps in information. Phones and PDAs have proven to possess great potential to deliver dramatically faster and more complete data than traditional methods of pen and paper. Moreover, such mobile devices can be more accurate and incur a lower total cost of ownership and implementation. The existing contribution and future promise of mobile technology was recently underscored by the launching of the mHealth Alliance by the UN, Vodafone, and the Rockefeller Foundation and release of the report “mHealth for Development: The Opportunity of Mobile Technology for Healthcare in the Developing World”.

Many of the highlighted organizations in the report belong to the OpenROSA consortium and are using JavaROSA for phone-based data collection. The OpenROSA ([www.openrosa.org](http://www.openrosa.org)) consortium is a group of organizations working together to foster open source, standards-based tools for mobile data collection, aggregation, analysis, and reporting. One of its primary outputs has been the open source JavaROSA (available at [code.javarosa.org](http://code.javarosa.org)) codebase, which has emerged as the prominent open source, standards-based and interoperable software for data collection on a wide range of Java-enabled phones. JavaROSA has active developers in Bangladesh, Kenya, India, Norway, Pakistan, South Africa, Tanzania, Uganda, and the United States.

The emergence of JavaROSA has greatly reduced the duplication of effort among groups developing solutions for mobile phone-based data collection. For example, EpiSurveyor and EpiHandy, the two largest open source applications for mobile data collection in low-income countries, are both focusing on JavaROSA as their mobile phone platform. JavaROSA is one of few open source health applications in use in sub-Saharan Africa that has substantial code contributions from multiple institutions. JavaROSA has an active developers' mailing list, chat channel and documentation wikis. It has invested effort into several software engineering tools such as support for issue tracking, unit tests, automated build servers, and project management tools. The developer mailing list has over 100 members from over 15 countries. JavaROSA is also part of a new “Coded in Country” initiative<sup>1</sup> which seeks to promote a label, akin to the FairTrade label for software projects. A software application can be labeled as Coded in Country if at least half of the money for software development supported developers from and in low-income countries. DataDyne's office in Nairobi is a Coded in Country node and JavaROSA has been a primary focus of its junior developers.

OpenROSA and JavaROSA were launched with funding from the Canadian International Development Research Centre (IDRC) and has received direct core funding from the Rockefeller Foundation, the World Health Organization, and EpiHandy as well as the many organizations that have invested resources into developing and consolidating the code base and strengthening the community's skills. JavaROSA has been fortunate to have both senior and junior developers from both the developed and developing world working in collaboration to ensure that best practices around design, development, testing, and releases are used.

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<sup>1</sup> The founding members of the Coded in Country (CIC) initiative are D-Tree International, Dimagi and DataDyne. (please correct me if I have misrepresented this).

The OpenROSA consortium's focus is on applications that are appropriate in the areas of extreme poverty, and thus its mission includes the investigation of issues such as power supply, privacy, perceptions of the use of mobile devices within health settings, gendered perceptions, and designing systems for use on low-cost devices. The consortium promotes the sharing of experiences on these topics and seeks to promote research into these issues as well as the evaluation of the uptake and health impacts of OpenROSA projects.

Because JavaROSA is open source, different applications can quickly be built upon the core functionality. In particular, JavaROSA is designed to support interaction with generic survey systems, electronic medical record systems (EMRs), and can maintain longitudinal records over time.

<b>Application matrix:</b>	<i>Solutions based on JavaROSA</i>	<i>Organizations</i>
<i>Surveillance, Surveys, Supportive Supervision, and Forms Collection and Management</i>	GATHER, EpiSurveyor, EpiHandy, UReport	Cell-Life, DataDyne, AED-SATELLIFE, Univ. Bergen, Univ. Makerere, Google, Univ. Washington, Dimagi
<i>Decision Support</i>	CommCare, e-IMCI, HIV triage	D-tree, Univ. Washington, Dimagi
<i>Longitudinal Studies, including Clinical Trials.</i>	GATHER, EpiHandy	AED-SATELLIFE, Univ. Bergen, Univ. Makerere, Dimagi
<i>Medical Record Systems</i>	Mobile client for OpenMRS	MRC-SA, D-tree, Univ. Makerere, Cell-life, Dimagi
<i>Telemedicine</i>	Cervical Cancer Screening	CIDRZ, Dimagi

The first OpenROSA meeting was held in Boston 2007 with the objective of determining if there was value in forming the consortium. Subsequent meetings were designed to further share experienced and strengthen our collaboration. The previous OpenROSA meeting, before the one that took place in July 2009, was held in Durban at the Health Informatics of South Africa (HISA) meeting – June 2008. The meeting was successful on many levels. Several new members were introduced to and able to present their work at OpenROSA. Notable examples include Mennonite Economic Development Associates (MEDA) and the Strategic Sciences Institute. Furthermore, the OpenROSA members were able to discuss and refine our joint goals and plans. The meeting also came at a critical time in the development of JavaROSA. We identified several areas in which member organizations were developing modules in parallel. The programming team worked together in many ad-hoc sessions during the subsequent days of the HISA conference to produce a unified framework and we all agreed to a two-month refactoring process in which we consolidated code even though it meant some temporary slowing down of our JavaROSA deployments. This process included developers around the globe and was mediated by a Skype chat session with 15 or so people. This chat session continues to this day with new people joining frequently.

## Objectives

The objectives of the July 2009 meeting (paraphrased from the proposal to IDRC) were to:

- Provide a space and opportunity for the OpenROSA community to spend time together and update each other on projects

- Organize and deliver tutorials and discussions on topics that most OpenROSA members would like to improve upon, such as evaluation and research, engaging with Ministries of Health and other important stakeholders, and strengthening local software capacity to develop mHealth applications
- Improve OpenROSA's coordination and organizational strategies in the expanding ecosystem of mHealth
- Improve JavaROSA coordination, by addressing the following issues:
  - Status of current code and features
  - Priority setting
  - Release strategy
  - Starting an implementers group
  - Code gatekeepers
  - Licensing

The expected outcomes of the meeting (taken verbatim from the proposal to IDRC) are:

- Growth of the OpenROSA network
- Improved research skills and refined research goals of OpenROSA consortium
- Improved consensus on several strategic decisions for OpenROSA including its role in the ecosystem of similar mobile health consortiums.
- Several decisions jointly made for JavaROSA such as licensing and release strategy
- Progress on strengthening the capacity of junior developers to develop mobile applications

## Activities

The meeting took place from July 20-23, 2009 at the Kunduchi Hotel in Dar es Salaam, Tanzania.

Appendix A shows the complete agenda. But to summarize the main activities included:

- A training day in which experts in JavaROSA taught people who were new to the community. We divided up the day into three parts
  - A basic overview for people who would use JavaROSA out of the box
  - XForm training for implementers who might need complex forms
  - A primer on software development of JavaROSA for those who want to build or extend applications. We worked to get people set up with an environment to develop things.
- Two and half days of plenary: we had one large room in which most of the sessions were held. The activities included:
  - Updates from existing OpenROSA members: we use a format in which somebody presents for 5 minutes and then there is about 5 minutes of discussion.
  - Updates from new members of OpenROSA—using the same format as the other updates.
  - An overview of mHealth and brainstorming of new mHealth applications

- A research methodology session in which the groups designed studies of their research projects
- Capacity strengthening—several discussions about how to develop software capacity for mobile applications, including presentations on Coded in Country and by the new Tanzanian Innovation group called ITIDO.
- “Coder’s corner”
  - During two-half days (one day total), the core coders of JavaROSA left the big room and went to their own small room to discuss a series of critical coding decisions. The list of topics had been prepared before the meeting.

## Outcomes

From the organizer’s perspective, the meeting was a huge success - 94 people registered and 90 attended. The logistics went (remarkably) smoothly, and there was a wonderful mood of excitement, productivity, innovation, and general enthusiasm throughout the session. We went out on the beach to take a group photo and it turned into a 30 minute photo-fest with little groups constantly forming for different photographs.

We first report back against the expected outcomes of the meeting, as per our initial proposal:

### ***Expected outcome: Growth of the OpenROSA network***

- The meeting was full of formal and informal networking opportunities that not only supported the growth of the network, but also strengthened existing bonds and formulated new ones.
- Many new relationships were formed with OpenROSA. For example, Melissa Loudon from the University of Cape Town met and agreed to mentor Ruthneema Swai, a first year computing student at the University of Dar es Salaam.
- Many new programmers (especially students from the University of Dar es Salaam) were set up to develop and use JavaROSA.

### ***Expected outcome: Improved research skills and refined research goals of OpenROSA consortium***

- We had two excellent sessions led by Heather Zornetzer and Neal Lesh on research methodology which several participants described as the most useful session in the meeting for them.
- CommCare internship: we also used some excess funds from IDRC to create a 4-month internship for Irene Joseph, who has just graded from the University of Dar Es Salaam, to work with D-tree on the deployment of CommCare for BRAC’s (a large Bangladeshi development agency) community health workers.

***Expected outcome: Improved consensus on several strategic decisions for OpenROSA including its role in the ecosystem of similar mobile health consortiums.***

As discussed below, we did not make much progress on discussing OpenROSA's role in the larger mHealth ecosystem

***Expected outcome: Several decisions jointly made for JavaROSA such as licensing and release strategy***

- Agreement on several key decisions (see Appendix C)
- A specific plan for the next few months of coding (see Appendix C)
- Agreement to meet again (just the Coder's Corner) in December or January. Planning is underway.

***Expected outcome: Progress on strengthening the capacity of junior developers to develop mobile applications***

- The discussion around Coded in Country generated a great deal of increased excitement around Coded in Country.
- Many new programmers (especially students from the University of Dar es Salaam) were set up to develop and use JavaROSA.
- Support for ITIDO (mentioned below).

***Unexpected outcomes***

- The "Coder's Corner" idea has stuck and created a useful notion of the core team that is working deep on the code. There was a small, coder's corner meeting in Boston at the Dimagi offices in January 2010.
- ITIDO & CommTrack (for tracking the status of resources such as equipment or water sources): one of the major outcomes of this meeting was support for a new group in Tanzania called Invention and Technological Ideas Development Organization (ITIDO) run by Jacob Mtalitinya. During the meeting:
  - Jacob worked closely with many people to refine his concept note for ITIDO and for an upcoming conference.
  - We decided upon an initial project for ITIDO involving JavaROSA called CommTrack . We had several planning meetings on this.
  - Some excess funds were allocated to support about 4 months of programming by ITIDO programmers on CommTrack. This fit within the expected outcome of increased capacity of junior developers. Therefore, IDRC approved its allocation for this purpose.
  - The week after the meeting, we submitted a proposal to Rockefeller which included funds for ITIDO to develop CommTrack with substantial supervision from expert programmers (which has since been funded).
- We identified an important use case for the attendees from CDC Kenya in which they could use RapidSMS by village-based observers to trigger more indepth interviews using smartphones of important events.



- We developed an idea with Lawrence Odongo from Sega Silicon Valley to build in mHealth tools using JavaROSA and RapidSMS into their standard hardware package for schools. We would build easy to use tools to allow children to deploy simple mHealth applications.

## Reporting back against the objectives

We met most of our objectives and exceeded several of them.

The one objective we did not meet fully was “Improved consensus on several strategic decisions for OpenROSA including its role in the ecosystem of similar mobile health consortiums.” We had hoped to get a representative of the Open Mobile Consortium (other than the organizers of OpenROSA) to attend and present, but all were unavailable. Also, a few of the key decision makers of OpenROSA were not at the meeting. Therefore, it didn’t seem an appropriate venue to engage in this discussion.

We certainly expanded the OpenROSA network and made progress on improving our research skills. We had a great deal of progress on capacity building. Several of the organizers of this conference have formed some additional proposals to continue this capacity building in other parts of Africa.

The Coder’s Corners exceeded everybody’s expectations—the entire list of topics was covered and renewed excitement among the developer community was created. A goal of meeting towards the end of 2009 or early 2010 among the core committers was set.

## Recommendations and next steps

The first OpenROSA meeting was less than two years ago. We are still very much in formation. We have emphasized action (meetings, JavaROSA, promoting XForms) over organization (websites, governing committees) but probably need to do more of the latter. There is funding in the OASIS II grant, also funded by IDRC, to improve the website. There is also funding in the OASIS II grant for several internships which are likely to be used to pursue ideas generated at the OpenROSA meeting.

We need to plan and seek funding for a 2010 OpenROSA meeting.

While many groups are using JavaROSA for many things, very few are contributing back to the primary code base. Most of the active members such as Cell Life and DataDyne have forked their version of the code over a year ago. With recent major changes, they are now even farther from the main branch. It is a challenge for groups to invest the time to ‘upgrade’ to a new release of the code though. We are hopeful, however, to soon get core funding from Rockefeller for JavaROSA which includes money for most of these groups—this funding should help incentivize (or require) these groups to rejoin the main branch of the code. By rejoining the main trunk of the code, these groups will be able to benefit from new features and bug fixes as they are added. However, it often requires an investment of time to make this switch and it can temporarily be worse before it gets better.

We should focus on interoperability which has been the primary success of the OpenROSA. There are several groups all using XForms, and it is allowing us to share our tools and hold the community together. Even groups outside of OpenROSA see XForms as the natural standard for mobile-based data—we believe this is largely due to the efforts of the OpenROSA community. This is a great accomplishment and we need to continue to promote it.

We do need to figure out how OpenROSA fits in with efforts such as the OpenXData, the Open Mobile Consortium, and the mHealth Alliance. This is a challenge in that all of these groups are still in formation as well.

## **Appendix A: Agenda**

<b>Monday July 20</b>				
Start	End	Topic	Session Chair	Presenters
09:30	10:00	Welcome and introductions	Neal, Kieran, Mark, Jacob	
10:00	10:45	Basic JavaROSA Part I	Mark	Kieran, Brian DeRenzi
10:45	11:45	Coffee Break		
11:45	12:30	Basic JavaROSA Part I	Mark	Kieran, Brian DeRenzi
12:30	14:00	Lunch		
14:00	14:45	XForm training Part I	Mark	Drew Roos, Gayo Mhila
14:45	15:00	Quick break		
15:00	15:45	XForm training Part II	Mark	Drew Roos, Gayo Mhila
15:45	16:15	Coffee Break		
16:15	17:00	JavaROSA development I	Mark	Tom Routen, Clayton Sims
17:00	17:15	Quick break		
17:15	18:00	JavaROSA development II	Mark	Tom Routen, Clayton Sims
18:00	18:30	Receipt table	Natalie	
<b>Tuesday July 21</b>				
09:00	9:30	Welcome, Agenda review	Neal	
9:30	10:45	OpenROSA updates	Yaw Anokwa	Cell Life(Kieran); UW (Gayo Mhila); D-tree (John Wesonga); Makerere (Mark);
10:45	11:30	Coffee Break		
11:30	12:30	OpenROSA updates	Yaw Anokwa	DataDyne (Geoff Muthondu); Dimagi (Jon Jackson); ODK (Yaw Anokwa)
12:30	14:00	Lunch		
14:00	14:15	Open "Coding Corner"	Kieran	
14:15	15:30	Overview of mHealth, small group brainstorming	-	Neal
15:30	16:00	Coffee break		
16:00	17:00	Group discussions	-	
17:00	17:45	Coded in Country	-	Jonathan Jackson
17:45	18:00	ITIDO presentation	-	Jacob
18:30		Cocktail party		
<b>Wednesday July 22</b>				
Start	End	Topic	Chair	Presenters

14:00	15:30	New group presentations	Lawrence	<ol style="list-style-type: none"> <li>1. UCT (Melissa Louden);</li> <li>2. Tim Akinbo &amp; Solomon Adebayo;</li> <li>3. AMPATH (Sam Mbugua);</li> <li>4. DHIS (Juma Lungo )</li> <li>5. GPS tracking (Sadick Masomhe)</li> </ol>
15:30	16:00	Coffee Break		
16:00	17:00	New group presentations	Lawrence	<ol style="list-style-type: none"> <li>1. CDC Kenya (2 slots, TBD);</li> <li>2. WaterAid (David Taylor);</li> <li>3. HANDSREL (Raghu/Nishant)</li> </ol> <p><i>Others—please let us know if you would like to present</i></p>
17:00	17:45	Authoring System Presentation and discussion		Denis Bahati
<b>Thursday July 23</b>				
09:00	12:00	<ul style="list-style-type: none"> <li>• Roundtable discussion of common topics many of us are facing <ul style="list-style-type: none"> <li>○ Training</li> <li>○ Charging</li> <li>○ Fraud data</li> <li>○ Evaluating impact</li> </ul> </li> <li>• JavaROSA experts and students small sessions</li> </ul> <p>Feedback, review and ideas for next year's conference.</p>	Neal, Kieran, Mark, Jacob	

## Appendix B: Attendee list

Name	Organization	Email
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## Appendix C: Coder's Corner Topics and Outcomes

Topics to be discussed (decided before meeting):

- define APIs/standards
- make things more modular
- DVCS/code organization
- rethink core to support external projects (e.g. ODK)
- rewrite old code (transport and RMS and ???)
- should javarosa be dependent on polish?
- OpenRosa standard
  
- memory footprint/low-spec devices
- eliminate duplication/czar of different parts of code
- quality of code/stable code base that can scale for our applications
- commit access (technical committee)
- PSC - all 11 candidates are part of the steering committee
- code review process
- versioning

Agreed upon TODO items:

- move validator and shellformtest to javarosa-validator repository
- change name of javarosa-extras to javarosa-tools
- from j2merosa-examples, move all the projects that aren't demo to a dimagi repo
- for the demo, have it build off of JARs
- remove profile project
- [jon] email the group with the list of project steering committee members
- PSC to vote on gatekeepers.
- [tom] eclipse formatter file and errors/warnings setup in eclipse
- [tom] propose best practices for code writing
- [tom] checklist for code reviews (including checking that they are approved open source people)
- [jon/yaw] contributors agreement
- [drew/clayton] change JR prefix stuff to OR prefix
- [kieran] look into the device benchmarking stuff
- [kieran] add support for <label lang="xxx"> for XForm internationalization
- [clayton/brian/mark] work on internationalization to make it as friendly as polish to use. make sure it is debugged?
- determine which services will become factory and which will be singletons)
- [yaw/clayton] JavaRosa Core API
- [tom/alfred/geoffrey/mark] J2MERosa Core API
- [jon/brian] public facing web site for javarosa
- [melissa] investigate blog for javarosa

## Outcomes

- J2MERosa is happy to be dependent on Polish.
- Going to try to get model to work in "picoRosa" (core + new code or epihandymobile)
- Put the names of XForms in XHTML
- Single JAR built for the JavaRosa Core
- \*\* automated testing to make sure that xform parsing gets obfuscated out
- \*\* eclipse environment will also show any changes with modularity
- Repository restructure and generating JARs. (see JARs.rtf)
- low-end device means: 256kb jar / 600kb heap CLDC 1.0 MIDP 2.0
- Breaking RMS (without an upgrader) is a major version change
- Each JAR is versioned.
- Community only releases set of JARs together. Zip up JARs and release them all at once.
- All 11 candidates are part of the steering committee
- \*\* Reasonable response time to proposals is expected (unless vacation etc...)
- We will use review-board for code review
- Definition: JavaRosa is a brand name used for funding purposes.
- Definition: JavaRosa Core is a library published by the OpenRosa Consortium
- Definition: OpeRosa is a standards body.
- Every minor release we run a standard javarosa-demo and fill out a table
- Add support for <label lang="xxx"> for XForm internationalization
- JRSP is dead. (replaced by individual services that are either singletons or factories)
- Use issue tracker on bitbucket
- Developer home is the JavaRosa wiki on bitbucket
- javarosa.org is public facing website for non-developers