

# OpenROSA, JavaROSA, GloballyMobile – Collaborations around Open Standards for Mobile Applications

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**Abstract:** The paper reports on three interrelated open standards and coding collaboration efforts: OpenROSA, JavaROSA and GloballyMobile. The OpenROSA consortium was established to reduce duplication of effort among the many groups working on mobile data collection systems. The goal is to foster open-source, standards-based tools for mobile data collection, aggregation, analysis, and reporting. JavaROSA is an open-source platform for data collection on mobile devices. At its core, JavaROSA is based on the XForms standard – the official W3C standard for next-generation data collection and interchange. The mission of GloballyMobile is to cooperate on mobile phone application development, testing, and implementation, while sharing plans, progress, and lessons learned, in order to promote innovation, increase efficiency, and maximize the impact of humanitarian assistance. The paper also give a brief overview of projects under the OpenROSA umbrella which uses JavaROSA as the mobile data capture solution.

## 1. Open Source Software Development for Social Development

Through our experience over the course of seven years, we have come to embrace the principles of open source software development for reasons of sustainability and the increased opportunities to work on larger, in particular health-centric, development efforts.

In this presentation, several authors from different but closely related initiatives present their missions. The initiatives covered are: GloballyMobile, OpenROSA, and JavaROSA, presented in section 2,3, and 4, respectively, and summarized in Figure 1.

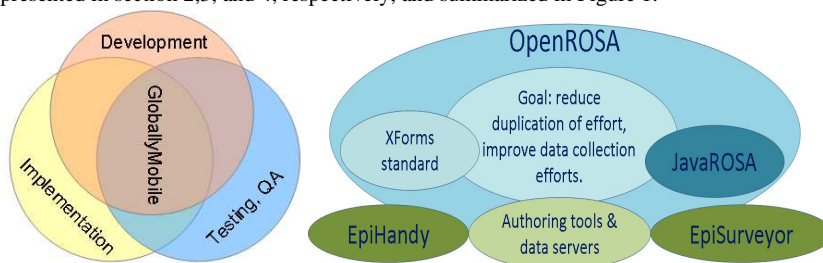


Figure 1: Conceptual Architectures of GloballyMobile and OpenROSA

## 2. GloballyMobile

The mission of GloballyMobile [1] is to cooperate on the development, testing, and implementation of mobile phone applications (Figure 1), including sharing plans, progress, and lessons learned, in order to promote innovation, increase efficiency, and maximize the impact of humanitarian assistance.

Members of GloballyMobile are devoted to development, testing and implementation and being truly open source through easy availability of code, documentation, testing procedures and sharing of lab resources.

GloballyMobile brings together independent groups to determine common goals to be pursued collaboratively. GloballyMobile partners will move forward with the technology available in order to avoid duplicating efforts by recoding functionalities that already exist in other applications, while simultaneously work toward the future of mobile technologies.

GloballyMobile is establishing reference implementations on integration of the technologies found in the consortium. This is done through sponsored “code sprints” every month, where 3-4 developers get together and work on a technical specific problem and by the same token, identify areas of research that no member organization has covered to date.

GloballyMobile aims to integrate as many of the existing applications as possible into this project, focusing on each application’s key functionality and how these applications complement each other in the field. In the start-up phase of GloballyMobile, each member organization continues on their singleton efforts, while sharing experiences and reports to derive best practices.

GloballyMobile is making applications interoperable and usable as a part of a large project in a country where access to the Internet and to mobile network coverage might be discontinuous.

A Quality Assurance process to certify applications as “GloballyMobile Approved” is being established and includes criteria such as stability, usefulness, potential for implementation, and interoperability with other applications.

The first outcome of GloballyMobile has been the agreement on a protocol for applications to talk to each other, and agreement on using Mesh4X for asynchronous file synchronization, this can also be used across multiple devices (peer-to-peer) even when a device is not online.

A website with an up-to-date knowledgebase on mobile and SMS technologies – which will include: teaching courses, research publications, hardware recommendations, GloballyMobile product comparisons, best practices and shared public libraries – will be established at <http://www.globallymobile.org>.

GloballyMobile seeks to build strategic partnerships with other organizations with overlapping focus areas including MobileActive, ITU, GSMA, OpenROSA (see separate section below) and the W3C.

GloballyMobile has a great potential as being a catalyst in producing and supporting innovative ideas and systems for the improved health and lives of the population of our globe.

## 3. OpenROSA

Prior to the establishment of OpenROSA [2] there were a number of free and open source tools available for doing data collection on mobile devices and handheld computers (Palm, WindowsMobile, Symbian).

The OpenROSA consortium was established to reduce duplication of effort among the many groups working on mobile data collection systems. The goal is to foster open-source, standards-based tools for mobile data collection, aggregation, analysis, and reporting (Figure 1). By developing open source solutions and conforming to standards based on the XForms specification, different projects can easily share code, data, ideas and infrastructure.

Many of the consortium members are working on JavaROSA (see section 4 below), an open source J2ME codebase that conforms to the OpenROSA standards. JavaROSA is being

developed for a wide range of uses, including disease surveillance, household surveys, collection of longitudinal data for electronic medical records, guiding health workers through medical protocols at the point of care, and supporting community health workers.

OpenROSA has been successful this far based on the common need by many of the collaborating groups on “adding” a mobile data capture solution to their already existing singleton effort.

There are ongoing discussions and efforts on merging more than the mobile part of the solutions found within OpenROSA. Ongoing discussions are building on, e.g., common forms authoring tools, data management systems, etc. This seems to be a bit more problematic as most groups have a branding and funding challenge when they no longer are the sole “owners” of a solution. There are many disincentives for merging the “complete packages” due to organizational ownerships and publicity of “own solutions” in a competitive environment.

A major challenge to using mobile devices for data capture and management is the lack of standardized forms capture and handling functionality on phones. To use e.g. JavaROSA users must download the application, install it, download forms etc. Further J2ME has its limitations in targeting the wide size and functionality spectrum of mobile phones. The capability to send someone a form, have it displayed on the device, and have it sent back to a preconfigured route should ideally be a preinstalled function of any phone.

We are all acquainted with using SMS and MMS – likewise there is a need for manufacturers and service providers to come together to create a new standardized service: MXF (Mobile xForms). MXF would allow a user to accept requests to questionnaires / forms and fill them out offline, and once complete be able to submit using e.g. GPRS / SMS / MMS or other available data transmission means.

The authors have been involved in building three mobile data collection applications. These software systems include EpiHandy [3], a PDA and phone based data collection software system for surveys and research (demonstrated at the M4D conference), MobileHRS [4], a PDA based system for collecting Demographic Surveillance data, and finally JavaRosa [5], a cell phone based software system. Developing these applications generated valuable experiences on the problems, complexities, and opportunities created in this kind of software development effort.

#### **4. JavaROSA**

Through developing and supporting mobile-based data collection software for use in developing countries, we have come to embrace the principles of open source software development for reasons of sustainability and the increased opportunities to work on larger, more health-centric, development efforts.

Our latest project, collaborating with an international team of software developers who are building JavaRosa, an open source data collection forms engine for cell phones, is particularly interesting from an applications development perspective. This open source development effort has significantly changed the nature of our systems development. While we do not “own” many of the pieces of the application, we nevertheless derive considerable benefit from the software, viz. from the ongoing, daily, conversations about features and design, the focus on building from standards, and the use of open source development tools and technologies.

The development of JavaROSA was driven through the participants shared need for a forms data collection engine on a cell phone and therefore gained from the collaboration. The use of Form specification with xForms, a W3C standard, made a clear scope. The agreement on a third party standard (xForms) was a key and powerful enabler to create interoperability between the existing systems of groups involved.

The development team is truly international with daily online discussions and mailing lists and there is an infrastructure for new and existing developers with: Web site, Getting

Started, Developer documentation, Trac software for wiki, discussion groups, tickets, browse source.

JavaROSA has successfully been implemented and is being implemented in many different software solutions [6]. JavaROSA has already been tested and used in several of these and other applications, details of these evaluations will be published separately by the individual organizations. Some examples of this are:

1. GATHER, by AED Satellife (US), Dimagi (US), and Uganda MoH in Uganda
2. LimeSurvey in SouthAfrica, by Cell-Life, SouthAfrica
3. EpiSurveyour in Kenya, by DataDyne, US
4. CommCare in Tanzania/Uganda, by D-tree and University of Washington, US
5. EpiHandy in Uganda, by University of Makerere, Uganda, and University of Bergen, Norway. Through EpiHandyMobile (demonstrated at the M4D conference), which is merged into JavaROSA

## 5. Concluding Remarks

The establishment of OpenROSA and GloballyMobile has the potential of greatly reducing the common problem of duplication of efforts in the space of development, and in this case the space of mobile phones for development.

The example of JavaROSA shows that it is possible to collaborate across organizations, persons, countries and continents when the outcome and merits of the outcome can be shared by the contributing organizations and persons. Lessons from JavaROSA shows that joint efforts pay off, breeds more robust solutions with better architecture due to focus on standards, better support (for devices, updates, bugfixes) and require focus on common functionality. However, collaboration increased development time, but is worth it and "Go fast, go alone. Go long, go together!" [7] is a good summary of our experiences.

Defining standards and, where possible, collaborating on code level through open source principles can hopefully bring better solutions faster and cheaper than what has been achieved to date.

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This paper is created based on documents produced through the different collaborations described here and is therefore based on input and contributions from many more persons than those listed specifically in this paper.

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## References

[1] [www.globallymobile.org](http://www.globallymobile.org)

[2] [www.openrosa.org](http://www.openrosa.org)

[3] [www.epihandy.org](http://www.epihandy.org)

[4] [www.mobilehrs.org](http://www.mobilehrs.org)

[5] [code.javarosa.org](http://code.javarosa.org)

[6] <http://code.javarosa.org/wiki/Stories>

[7] One of many variations of the African proverb:

"If you want to go fast; go alone. If you want to go far; go together."