



Freedom Fone and LIRNEasia Case Study

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Background

[Freedom Fone](http://www.freedomfone.org)¹ is a free and open source software development initiative of The Kubatana Trust of Zimbabwe. Freedom Fone's interactive voice response (IVR) menus, voicemail and SMS features enable organisations to rapidly set up automated 24/7 information services in any language for telephone callers to share and access voice based information on demand. The platform can run independent of the Internet for users and callers alike.

[LIRNEasia](http://www.lirneasia.net)² is a regional information and communication technology (ICT) think tank active across the Asia Pacific. They have extensive experience in disaster communication research. Nuwan Waidyanatha, Senior Researcher and Project Director with LIRNEasia, is also Project Management and Standards/Interoperability Committee Member at [Sahana Software Foundation](http://www.sahanafoundation.org).³

In 2011 Freedom Fone commissioned Waidyanatha to conduct research into whether Freedom Fone's voice-based features could make a meaningful contribution to emergency data exchange during crisis response. In particular, Freedom Fone was to be evaluated for integration as a voice channel for Sahana's disaster management modules.⁴ The results of this exercise are [available online](#).⁵

Suitability of Research Subject

LIRNEasia's experience in disaster communication research and Waidyanatha's relationship with Sahana are complemented by high adoption of mobiles in Sri Lanka. Mobile and fixed telecommunications operators cover more than 95% of Sri Lanka's terrain and over 90% of households have easy access to a telephone. Earlier research done by LIRNEasia in 2010 showed that simple telephone calls, by a large margin, are the most common use of mobile phones in Asia.

Sri Lanka is exposed to cyclones, floods, landslides and drought giving locals considerable experience in disaster response.⁶ The south west of the island, where LIRNEasia's research study was focused, is particularly disaster prone. Multiple local languages (Sinhala and Tamil being predominant) and illiteracy amongst the poor require communication strategies that remove literacy and language barriers. Simple telephone calls are part of such a solution.

From a global perspective, in our parts of the world people are vocal. We do business with voice. We don't write big memos, we don't write big e-mails, you just pick up the phone and you make a call, you talk to the person and you do your business. From that perspective Freedom Fone positions itself naturally in a very good way. - Nuwan Waidyanatha, Senior Researcher and Project Director with LIRNEasia

See the [YouTube interview](#)¹ with Nuwan Waidyanatha, Senior Researcher, LIRNEasia

¹ <http://www.freedomfone.org>

² <http://www.lirneasia.net/>

³ <http://sahanafoundation.org/>

⁴ Sahana is a proven technology specifically developed for disaster management that advocates international data standards. It is internationalised, and localised.

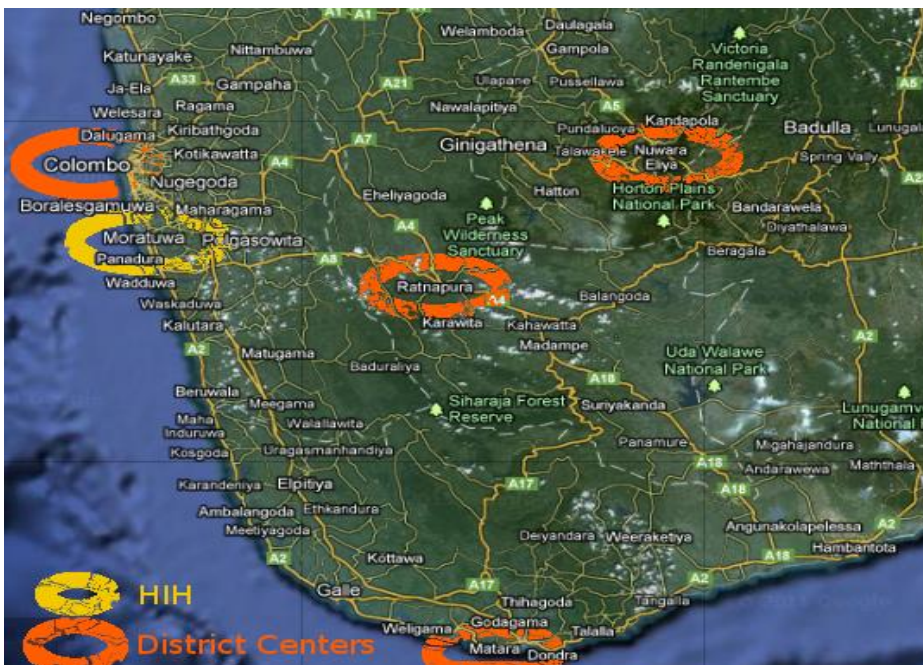
⁵ <http://lirneasia.net/projects/2010-12-research-program/ff4edxl/>

⁶ http://www.ideo.columbia.edu/chrr/research/profiles/pdfs/srilanka_profile1.pdf

Research Design

Waidyanatha worked with Lanka Jathika Sarovdaya Shramadan Sangamaya ([Sarvodaya](http://www.sarvodaya.org/)⁷), Sri Lanka's largest community focused humanitarian organisation, to conduct usability, utility and reliability tests. Sarvodaya is embedded in 15,000 of the 30,000 villages in Sri Lanka and engages in humanitarian assistance, responding to all national and local level disasters. Waidyanatha and colleagues established, through a survey, that telephone calls were Sarvodaya's main emergency information exchange mode between village based Community Emergency Response Team members and the incident management centre, referred to as the Hazard Information Hub, situated at Sarvodaya's head office.

Sarvodaya's Emergency Response Team field tested Freedom Fone in four districts: Colombo and Matara, two urbanised coastal cities; and Nuwara-eliya and Ratnapura, relatively smaller towns in the heart of the tea cultivation lands. The four districts had experienced major disasters in the past such as the 2004 tsunami, 2009/2011 floods and 2010 landslides.



Between 11 - 15 Sarvodaya Community Emergency Response Team members from each district, typically village leaders and referred to as CERT members, participated in the evaluation process. They were exposed to the Freedom Fone technology and given training in calling in to the interactive voice system for receiving Alerts and submitting Field-Observation reports.

Volunteers at Sarvodaya's Hazard Information Hub (HIH), referred to as HIH Operators (HIHO) by the project team, monitored hazard information through various websites and subscriptions (e.g. email bulletins or SMS alerts) for 'events of interest' that might be cause for concern (e.g., a cyclone originating in the Bay of Bengal). From here, relevant information bulletins were relayed to the CERT members who are responsible for activating local community emergency response plans (e.g. disseminating a local warning or supplying incident reports).

⁷ <http://www.sarvodaya.org/>

Prior to the controlled exercises, the HIH Operators underwent training involving knowledge on hazards, the use of technologies (Freedom Fone, Sahana and audio editing software - Audacity) and standard operating procedures.

The controlled exercise activities constituted three parts: discussion of the operating procedures, actual execution of those procedures, and evaluating the outcomes. These activities were designed as verification exercises to determine the complexity (interaction techniques, operational efficiency and data quality), usability (human action cycle, gulf of evaluation/execution) and utility (perceived ease of use, usefulness, attitude towards using) of the technologies and procedures.

The process at the HIH, illustrated in Figure 1, began with the HIH Operator on duty (termed as the HIH-Monitor) receiving a hazard event through an email bulletin. Then the HIH-Monitor would alert other HIH Operators and field-based Emergency Response Team members (CERT) to respond to the crisis situation. The alert message is created with SABRO, a Sahana module, and disseminated via SMS and the Freedom Fone IVR. Thereafter, the Sarvodaya HIH Operators receive Field-Observations from CERT members through Freedom Fone voicemail. HIH Operators translate those Sinhala and Tamil reports to English, then enter the categorical information into Eden-SitRep, another Sahana module, with complete Situation-Info. Subsequently, incident managers, at the HIH, would extract Response-Resource reports using Eden-SitRep.

With the current decoupled state of the software systems, namely SABRO, Freedom Fone, Audacity (used to edit audio for Freedom Fone IVR menus) and Eden-SitRep, the HIH Operator has to switch between the various softwares to complete the alerting and situational reporting work flow, thus:

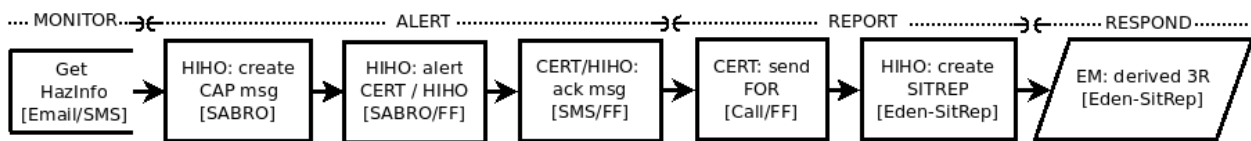


Figure 1: sequence of controlled exercise processes and information flow

In the field, CERT members called in to the Freedom Fone Interactive Voice Response system (IVR) using any kind of telephone, selected their preferred language and listened to the alerts recorded on the system. If they had a Field-Observation to share, they selected the option to leave a voice message and then hung up. A typical voice menu went like this: “Welcome to the Sarvodaya Disaster Management Centre, press 1 for Sinhala, press 2 for Tamil”. On selecting a language, callers heard a second voice menu: “Press 1 to listen to Alerts, press 2 to record a Field-Observation report (record a voice message), press 3 to submit answers to a Survey”.

Results

As a standalone solution, Freedom Fone is easy to install and operationalise in a very short time. There are some limitations with the fully bundled solution such as when trying to install and operationalise Freedom Fone to coexist with the Sahana disaster management system. What may seem trivial to an experienced information technology systems administrator was not so for average software developers and grassroots level Sarvodaya HIH Operators.

Given that Sarvodaya Community Emergency Response Team (CERT) members use voice telephony for their disaster communication, they found Freedom Fone to be easy to use, useful, and had a positive attitude towards integrating it in to their activities. Freedom Fone was the first experience of interacting



with an IVR for most CERT members and observation statistics reasoned that only 8.75% of the users found Freedom Fone to be difficult (or complex) to use and 84.31% completed their Freedom Fone activities in a single or couple of attempts.

The advantage of Freedom Fone is that it can carry localised descriptive messages. Relatively, an SMS text is limited by the number of characters and handsets are not always localised. Other means for exchanging descriptive messages over a mobile phone is through the Internet. However, utilisation of the Internet by grassroots level CERT members is perceived cumbersome. The relatively older mobile phone users are not comfortable with text based applications.

In the Sri Lankan context, with the need to accommodate three languages, Sinhala, Tamil, and English as well as lesser computer literates, the simple telephone call controlled Freedom Fone stands as a workable solution for Sarvodaya members. The sustenance of the system will depend on how Sarvodaya decides to integrate Freedom Fone into their daily activities (i.e. utilities beyond disaster management). A couple of suggestions that came from the users were to utilise it for project reporting and project information sharing. Then is it always operational and always ready to use.

There were inefficiencies at the HIH Hub that were mainly a result of the HIH Operators having to switch between multiple software systems to complete the work flows. Each action cycle, alerting and situational reporting, for the controlled exercises, took twice as long as expected. These inefficiencies can be improved with a stronger integration between Freedom Fone and Sahana as well as streamlining the processes to control the work flows. A better streamlined and integrated system would reduce the burden on the training requirements for multiple systems as well.

Experience on this project and other research show that voice data received over the telecommunication networks are degraded by more than 13% and the noisy data cannot be subject to any kind of Speech-To-Text transformation. Laboratory research points to Sinhala Text-to-Speech software performing with only 71% accuracy. Given these shortcomings, it is impossible to apply any kind of automation software to transform the information between Freedom Fone voice and Sahana text systems. Therefore, human intermediation is necessary. In spite of the audio quality issues, voicemail provides an important record of the exchange of information from the field and allows for information to be contributed when HIH Operators are busy or unavailable.

Conclusion

The lessons to date are promising for integrating voice for emergency communication; especially to bridge the last-mile with incident management hubs. Moreover, it is a particularly effective way to enable ICTs for low computer literate non-English working language community-based disaster management organisations in developing countries. Sahana Foundation and Freedom Fone are keen to pursue the integration of the two platforms. If successful, this would position the integrated voice-enabled disaster communication system for wider adoption, especially with community-based emergency management and response organisations.