

# Final Report

## *knowledge Sharing of Voice-enabled Information Communication Technology for Disasters (VoiceICT4D)*

By

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### Summary of the project outcomes

- LIRNEasia, through a [stakeholder forum](#), advocated the Sri Lanka Disaster Management Center (DMC) to move towards a multi-agency situational-awareness platform by creating a register of alerting authorities and then sharing its call center and Interactive Voice Response (IVR) system resources for emergency communication.
- The “[Do you Hear Me](#)” video, communicating the need for voice-enabled Information Communication Technologies (ICTs), to empower community-based emergency coordination, was visited by 496 viewers, of which 48 of them shared their knowledge on the subject. UNISDR debut film festival on DRR, selected our video as one of the best three in the category of “best human interest story”
- Peer-reviewed scientific articles presented the realization study evidence emphasizing the practical technical instabilities and deficits in those technologies. The message was news to most researchers and practitioners. IVR-based solutions are gradually gaining momentum.

### What was supposed to happen?

The [VoiceICT4D project](#) set out to influence researchers and practitioners to invest resources and foster an ecology for voice-enabled emergency communication. Such technologies would allow Community Emergency Response Team (CERT) members to communicate risk information for early mitigation of hazard events. Voice removes the needs for computer literacy and can be used in any spoken language.

This innovation's message, of IVRs for emergency coordination, was shared through a research [video](#), [digital story](#), peer-reviewed publications, [stakeholder forum](#) (public lecture) and emergency management on line forums. The objective was to learn of the pros and cons of the innovation from the emergency management community.

The findings from the [realization \(or feasibility\) study](#) were that voice quality, automation of exchanges between voice and text information, and some Human Computer Interactions were unreliable. These aspects were highlighted in all the diffusion material. The intent was to stimulate a reaction to those messages that would provide insights to improvements or alternate technologies.

Another intended outcome of the VoiceICT4D project was to identify and develop a partnership that would work towards enhancing voice-enabled technologies for emergency coordination. Thereafter, the partnership would work towards achieving those goals.

## What actually happened?

A series of peer-reviewed articles with empirical evidence gathered through the “feasibility study to enable Freedom Fone with voice-enabled Emergency Data Exchange”, action research, was published and presented to various stakeholders.

Engineering related challenges were shared with audiences associated with the Institute of Electrical and Electronic Engineers ([ICCIA2012](#) and [JCSSE2012](#)). Communication policy related findings were shared with [CPRafrica/south](#) and published with the Social Science Research Network. Emergency coordination knowledge was shared with disaster management researchers at the [CDAC](#) convention and [ISCRAM2012](#) conference. One paper was published in the IJISCRAM journal.

The published papers established the scientific evidence in support all other diffusion activities. It was difficult finding a single conference that had a balanced blend of disaster management experts, academics, and practitioners all in one. [ISCRAM](#) may have been the closest but was overwhelmed by academics and, almost, no practitioners.

A key element of the diffusion process was to intrigue the disaster management community with a video that highlighted ground truth for the need and challenges of operationalizing voice-enabled technologies in the field of disaster management. The video was shared through email blasts and by posting blurbs on on-line forums and website.

Statistics revealed that 496 had watched the video and 48 of them had responded to the associated questionnaire. A handful of other viewers left valuable comments with potential new technological developments or alternate areas to explore for improving the innovation.

The video and the action research published findings were the basis of the public lecture (or stakeholder forum). It was hosted at a time when the Sri Lanka DMC was under pressure for [miss managing crises](#) that had led to loss of lives. LIRNEasia seized the occasion by bring together the DMC, stakeholders, and the public to debate the intricacies. One recommendation was allowing local authorities to use the DMC operated voice-enabled technologies for managing their local crises.

## **What went well and what was the reason for this?**

### ***Influencing Policy***

The Sri Lanka Disaster Management Center (DMC) had invested in a CISCO call center, mainly to manage ambulatory and fire brigade services. The CISCO call center has an IVR, which the DMC had not thought of using. LIRNEasia researchers outline a set of actions that would allow them to expand their system for local alerting and situational reporting.

- 1) develop a register of alerting authorities to empower local authorities to manage their local crises
- 2) adopt emergency data exchange standards to foster interoperability between national and international systems for effective emergency coordination
- 3) integrate the Sahana disaster management system to coordinate localized alerting and incident reporting efforts to effectively deploy response resources.

The advocacy and the action plan was effective in making them realize the need and getting them to rise to the occasion. This is a major achievement for LIRNEasia because the actions are in tuned with LIRNEasia's mission; thus, evidence based policy advocacy for the greater inclusive social benefits. Now, the DMC will generously share their voice-enabled resources for local and national authorities to manage their own crises. Such an initiative would make the DMC less accountable for what the DMC cannot achieve but other agencies and local authorities could.

### ***Project objectives***

The in-depth feasibility study provided substantial supporting evidence. Those factual evidence were leveraged to attract emergency management practitioner and research communities. These facts were communicated in an effective way using multimedia and peer-reviewed articles. While the videos and presentations told the story the peer-reviewed articles supported the facts. Thus, the message that VoiceICT4D projected was taken seriously by those who paid attention. Therefore, the project was able to build several relationships with organizations willing to partner in future developments.

In the proposal the project had identified itself to be in it's "invention" stage and would need to exercise a diffusion program in order to explore the opportunity of building a partnership to transition in to an implementation stage. The diffusion activities were a success because they were able to develop several practical actionable plans to move forward (i.e. already achieving or completing the development stage in this phase).

### ***The global reach of the message***

The research video "do you hear me" was coupled with a questionnaire to receive inputs from the emergency management community (researchers and practitioners). We asked the video questionnaire respondents "which parts of the world they worked in". In Figure 1, the lower scale of 5 indicates that five responded indicated that they worked in lighter shaded regions. Higher number of 22 indicates that those respondents worked in India and Sri Lanka (the darker shaded regions). The level of impact of the video can be estimated by assuming

the people who saw the video would share the message or adopt such technologies for use in those countries.



Figure 1: Countries the respondents to the questionnaire work in

The respondents were professionally categorized; where most labeled themselves as practitioners, researchers, developers, and consultants (Figure 2).

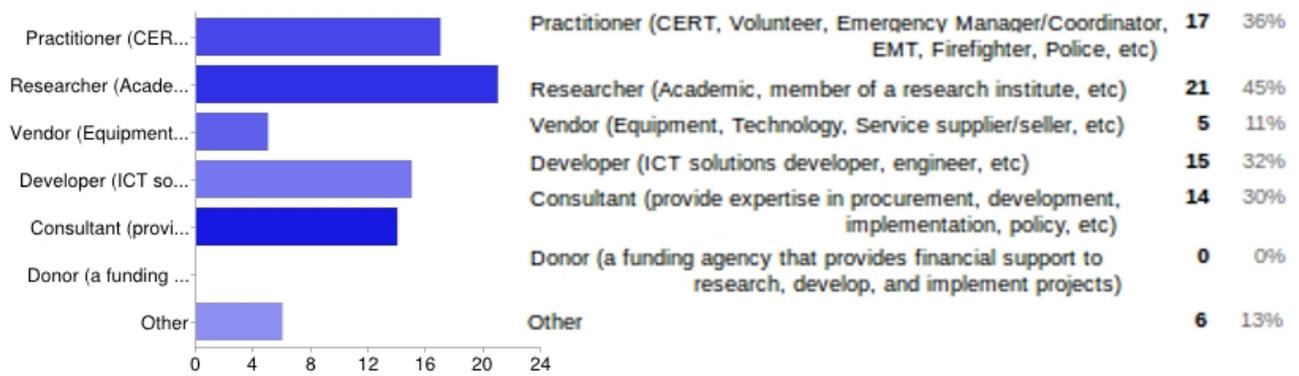


Figure 2: Respondents' occupation or working capacity

They acknowledged that voice-enabled technologies can complement almost all the listed emergency management related circumstances (Figure 3). None of them said that it was “not beneficial”.

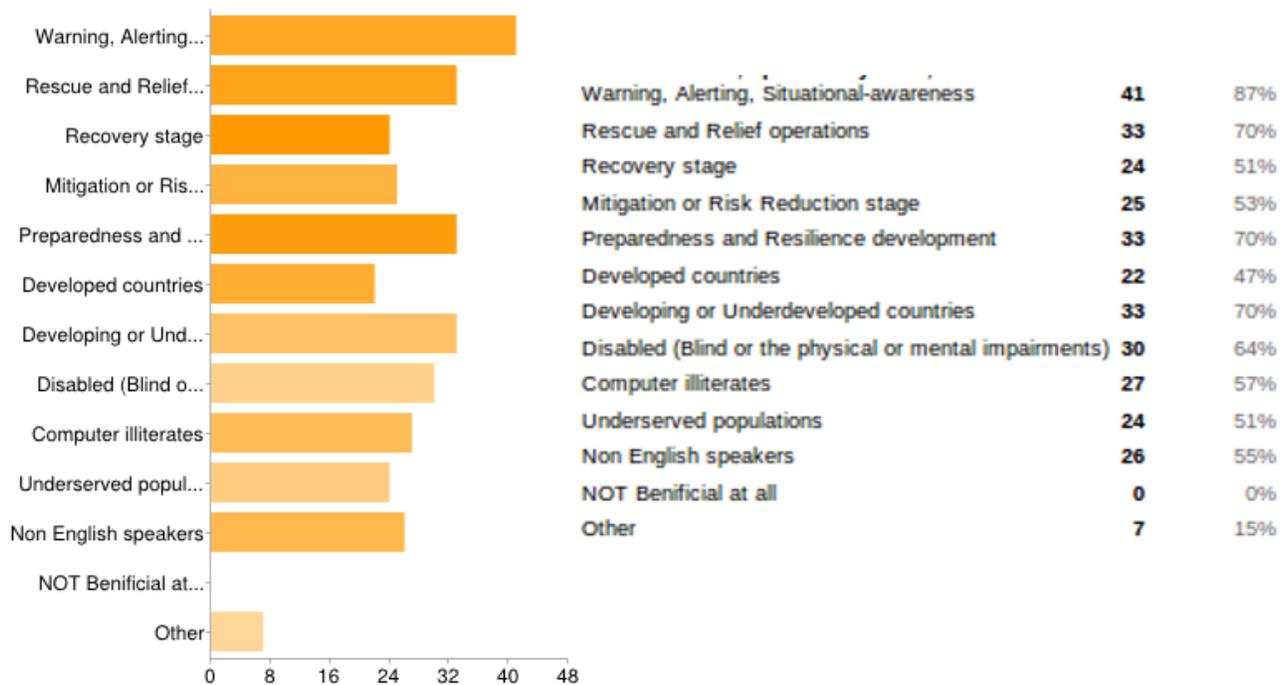


Figure 3: The emergency management circumstance in which voice-enabled ICTs can be beneficial

## What could be improved and how?

### ***Evaluation methodology***

The project realized that the questionnaires used in assessing certain parts of the diffusion activities, with quantifiable evidence, could have been improved and be made more scientifically correct. The resource limitations were the consequence. However, these lessons can be transferred in improving the evaluation methods of any similar diffusion related activities to be conducted in the future.

### ***Strengthening the next phase***

The project was able to document and effectively make the disaster management community realize the utility of IVRs. In the efforts also build relationships with various stakeholder organizations with vested interested in further improving IVRs for disaster management.

Most of the communications with those organizations were electronic. A face-to-face meeting would have been fruitful. Had their been sufficient funds, this could have been achieved through a series of regional “sharing of knowledge” workshops. Such a face-to-face meeting would have further strengthened the relationships in partnering to work towards an implementation stage.

### ***Delay effects of the Digital Story***

The project wanted to develop the digital story at an early stage. However, it was not completed until the end. The short fall may have missed opportunities of harnessing further

knowledge sharing actions.

### ***Think voice not text***

With the new age social media and advance text-based technology, the disaster management practitioners, especially, from the developed nations and those countries that use more popular languages, are inclined to advocate and use text-based technologies. Moreover, those countries that favor adopting text-based solutions have higher Internet penetration and computer literacy rates.

The VoiceICT4D message was important in the sense that it intended to alter the mindset of the western thinkers when recommending solutions for developing countries. Funding agencies and researchers are strongly advocating solutions like twitter, which has failed to integrate in to the social habitat in developing countries.

A randomized control trial or controlled-exercises that investigates the text-based solutions against the voice-enabled ICTs would be a more scientifically correct in proving the hypotheses. The two technologies would be deployed under varied implementation combinations; i.e. communities with access to the text-based ICTs, communities with access to the voice-enabled ICTs, communities exposed to both text and voice -based ICTs, and communities not exposed to either (control group), would be more appropriate, scientifically correct, research design.

### **What did we learn?**

IVR applications are gaining [momentum in the region](#). They are turning to be a “killer-app” serving the non-digizen by brining them closer to the digital habitat. There are several projects, the LIRNEasia researchers interacted with, that are taking shape: [CGNet Swara](#) for citizen journalism, [TCS Innovation Lab's](#) keyword-based train schedule and ticketing application, [IIT Madras's Agriculture information system](#) for mapping and collecting farming practices, [crisis map for the Central African Republic](#) (CAR) is specifically designed for incident management and interlinking with community radio, and [listening to the voice of Haiti](#) designed to stimulate accountability for faster feedback.

Although all those listed projects may seem as a competition to the VoiceICT4D innovation or they may share synergies of the Freedom Fone and Sahana integrated system, they seem to address a narrower scope. Whereas the Freedom Fone and Sahana integration would provide a comprehensive voice-enabled solution for managing all aspects of a crisis.

The Sahana modules are capable of managing incident report, alerting, missing persons, volunteer management, so on and so forth. Sahana adopts global interoperable standards for interlinking with other national and international systems. Moreover, Sahana and Freedom Fone are resourceful with well established open source development and support communities. Thus, providing an environment for anyone to absorb the solution and also seek support for their own deployments.

There is growing interest in improving the Freedom Fone IVR and Sahana software. Media organizations and community-based disaster management organizations would benefit the most. Both Freedom Fone and Sahana are FOSS products supported by a global community

with a large user base. New users don't need much in terms of infrastructure; simply a computer and a GSM modem. Then use the on line guides to install and operationalize the software.

The project realized the importance of radio; especially, when voice (or audio) content is in affect. Radio would be the agent sharing the information with the public. Therefore, the Sahana and Freedom Fone integration would make radio a two-way communication system but should consider making the interfaces suitable for radio broadcasters. For example, quick search of categorized voice cuts to air over the waves. Also be able to update any categorical information to provide up to date crisis information.

## **What next?**

A common consensus by various stakeholders are that the Freedom Fone IVR and Sahana disaster management system integration must be completed. The integration would serve non-latin scripting language and lesser computer literate communities. Moreover, develop an off the shelf implementable comprehensive crisis management solution that can be integrated with main stream media or other emergency management organizations.

There are three broad emergency communication use cases that were discovered through the VoicelCT4D activities:

- 1) a radio station would manage a missing persons registry comforting concerned citizens of who are missing and who were found
- 2) citizen journalists would share risk information of incident reports to effectively coordinate and respond to those troubled situations
- 3) community-based disaster management organizations would coordinate their rescue and relief efforts using interactive voice.

The VoicelCT4D project intends to seek resources to complete the integration, implement, and pilot the comprehensive end-to-end crisis management system. The pilot study would investigate the utility and robustness of such an implementation when applied to the three use cases above. Moreover, the pilot would consider implementing them in diverse environments to better understand the adaptability of the technology. VoicelCT4D would transition from the invention stage to an implementation stage; where the technology would be field tested to offer a stable solution to the global crisis management community.