Voice-enabled Messaging for Emergency Coordination in Sri Lanka: Lessons Learned

Emergency Policy Workshop

2012 May 01

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Community-based Disaster Management Center

Emergency Information Needs

- Community members (victims or associates)
  - call the District or Head Office
  - report of incidents.
- Collect ground truth
  - 2011 Floods, SCDMC dispatched youth with cameras, laptops, and dongles
- Blog situation on www.sarvodaya.org
- Get word to media and donors
- Secure response resources

Situational Information Communication Procedure

- Village fast responders
- Freedom phone server
- HH operators
- HH coordinator
- Head office management

Voice for Alerting and Response >> Full Story
Two key operations for community-based emergency response

**ALERTING**

Following a hazard event, activate CERT members and HIH operators to identify the incidents, then report the field observation.

**REPORTING**

Receive field observation reports, process them at the Hazard Information Hub to create Situational Reports.
Sarvodaya Alerting Needs

• Activate Community Emergency Response Team (CERT) member (wake up call)

• Inform them with details of the situation

• Use local languages: Sinhala and Tamil

• Adopt affordable and sustainable technologies that are integrated into their daily lives

• Apply complementary redundancy (more than one technology)
Sarvodaya use telephones to communicate, daily/weekly, IDP Info
# BOP Communications usage patterns in Sri Lanka

## What they do with mobile phones

<table>
<thead>
<tr>
<th>Activity</th>
<th>Bangladesh</th>
<th>Pakistan</th>
<th>India</th>
<th>S’Lanka</th>
<th>Java</th>
<th>Thailand</th>
</tr>
</thead>
<tbody>
<tr>
<td>Make phone calls</td>
<td>100</td>
<td>99</td>
<td>100</td>
<td>99</td>
<td>96</td>
<td>100</td>
</tr>
<tr>
<td>Receive phone calls</td>
<td>100</td>
<td>95</td>
<td>99</td>
<td>100</td>
<td>94</td>
<td>99</td>
</tr>
<tr>
<td>Send/receive missed calls</td>
<td>86</td>
<td>71</td>
<td>78</td>
<td>65</td>
<td>54</td>
<td>24</td>
</tr>
<tr>
<td>Send/receive SMS</td>
<td>19</td>
<td>38</td>
<td>23</td>
<td>55</td>
<td>89</td>
<td>37</td>
</tr>
<tr>
<td>Send/receive e-mail</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>5</td>
<td>14</td>
<td>8</td>
</tr>
<tr>
<td>Browse the Internet</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>10</td>
<td>10</td>
<td>5</td>
</tr>
<tr>
<td>Take photos/video</td>
<td>19</td>
<td>7</td>
<td>8</td>
<td>14</td>
<td>26</td>
<td>19</td>
</tr>
<tr>
<td>Play games</td>
<td>27</td>
<td>21</td>
<td>18</td>
<td>11</td>
<td>31</td>
<td>16</td>
</tr>
<tr>
<td>Listen to radio</td>
<td>13</td>
<td>15</td>
<td>12</td>
<td>17</td>
<td>26</td>
<td>18</td>
</tr>
<tr>
<td>Listen to music</td>
<td>25</td>
<td>5</td>
<td>15</td>
<td>8</td>
<td>26</td>
<td>30</td>
</tr>
<tr>
<td>Share that you have content created</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>2</td>
<td>8</td>
<td>3</td>
</tr>
<tr>
<td>Send/receive or download/upload other content</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>Use as an organizer</td>
<td>7</td>
<td>5</td>
<td>8</td>
<td>2</td>
<td>15</td>
<td>8</td>
</tr>
<tr>
<td>Check my bill/credit</td>
<td>13</td>
<td>20</td>
<td>11</td>
<td>18</td>
<td>16</td>
<td>3</td>
</tr>
<tr>
<td>Send/receive talk time/load</td>
<td>10</td>
<td>5</td>
<td>2</td>
<td>2</td>
<td>35</td>
<td>0</td>
</tr>
<tr>
<td>Access facebook</td>
<td>1</td>
<td>1</td>
<td>7</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Access other social networking or blog apps</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## Internet usage quite low

![Graph showing internet usage in different countries]

<table>
<thead>
<tr>
<th>Country</th>
<th>Bangladesh</th>
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<th>India</th>
<th>S’Lanka</th>
<th>Java</th>
<th>Thailand</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use the Internet (% of BOP teleusers)</td>
<td>2%</td>
<td>2%</td>
<td>1%</td>
<td>9%</td>
<td>21%</td>
<td></td>
</tr>
</tbody>
</table>
**Dropped calls** are high during hazard events
- Voice best after the Nth hour from disaster impact
- Recommended for *disaster response phase* (rescue and relief)
- Phones were not congested during 2012 Apr 11 tsunamigenic event because people starting to use social media now

Canada use IVR for rapid on-set tsunami warnings (< 60 min window)
- But too expensive for developing countries
- Definitely not for community-based organizations

**IVR removes language and computer literacy barriers**
- less burden on training regime
- **Sahana Disaster Management System** ([www.sahanafoundation.org](http://www.sahanafoundation.org))
  - FOSS humanitarian ICT tool but in several flavors: Agasti and Eden
  - supported by a global community of software engineers and emergency managers
  - categorical data important for decision support
  - Believes in interoperability

- **Freedom Fone** ([www.freedomfone.org](http://www.freedomfone.org))
  - FOSS IVR tool
  - Don't need Internet
  - Infrastructure: GSM modem + cheap PC
  - User Interface: standard telephones (mob + fix)

- **Audacity**
  - FOSS tool for making audio files
Downstream communication sequence

- Incident management center (i.e. HazInfoHub) generates EDXL-CAP messaging
- Transform that to a localized audio alert
- Upload audio file to IVR and revise menu
- Issue SMS to inform first-responders
- They listen to localized descriptive alert
CAP Profile for Sri Lanka

Proposed register of Alerting Authorities

- joint-iso-itu-t (2)
- alerting (49)
- wmo (0)
- authority (0)
- country-msg (1)
  - Ika (144)
  - dom (0)
  - doi (1)
  - dohs (2)
  - hd (0)
  - pdhs-lk.w (1)
  - pdhs-lk.nw (6)
  - rdd-lk.ad (71)
  - rdd-lk.kg (61)
  - rdhs-lk.kg (61)
  - moh-lk.kg (0)
  - moh-lk.kg (1)

Three Languages

- alert
  - <incidents>
  - <identifier>
  - <sent>
  - <sender>
  - <status>
  - <msgType>
  - <source>
  - <restriction>

9 Provinces
25 Districts
324 Divisions
14,008 Gramaniladari

Map of Sri Lanka with provinces and districts highlighted.
Delivering through IVR

1. XSLT

2. Translate paragraph, & record audio

3. Upload audio to IVR

**Heavy rains cause landslide in Nanuoya, Nuwaraeliya-District**

2012-04-30 05:04:38

Category of Geo and Message Type of Alert

**IVR Information**

**IVR ID**: 2.49.0.1.144.1-scdmc.hih-1335742622

**IVR Name**: test_landslide_nanuoya_20120430

**IVR Content**: This is a(n) Exercise Alert. Heavy rains cause landslide in Nuwara-eliya urgent priority Geo, Met, Rescue, Health, Transport event is(are) effective for Nuwara-eliya-District. The Geo, Met, Rescue, Health, Transport event is(are) Immediate and is Observed. Alert was issued by Manoj Silva. It is Restricted to HII-Operators and Community Emergency Response Team. Activate your emergency response plans means acknowledge alert and report to your duty stations. Alert is effective from: 2011-10-12T12:31:00+05.30-11:30 and will expire on: 2011-10-13T12:31:00+05.30-11:30. For more details call: +94770592117 or +94756677152

**Uploaded files**: [noisy_msg.mp3]
TTS required to reduce human work load

Text to Speech is only 71% reliable for Sinhala
Tamil might be slightly better in India
Toronto has a large Sri Lankan community
FCC has lifted the ban on CAP
Research Design

- Principal: Lanka Jathika **Sarvodaya** Shramadana Sangamaya
  - Sri Lanka's largest community development NGO
  - Also provide humanitarian services
- Hazard Information Hub @ Community Disaster Management Center, Moratuwa, HIH Manager, 3 HIH Operators
- Four Districts: Colombo, Matara, Nuwara-eliya, Ratnapura, ~ 10 - 15 CERT members from each district: Divisional/District Coordinators, Staff
CERT members receiving ALERTS through Freedom Fone

Avg. Call Time: 2:13 min
Avg. Msg Time: 1.59 min

Menu selection sequence:
1. Language (press #1 for sinhala)
2. Listen to Alerts (press #1 for Alerts)
3. Select to Alert (press #2 for "landslide in Ratnapura 2011 Nov 10")
Mean Time to Completion

**Actions:**

- MONITOR
- ALERT
- REPORT
- RESPOND

**Systems:**

- Email
- Audacity
- Freedom Fone
- Eden-SitRep
- Sahana Eden

<table>
<thead>
<tr>
<th>Process</th>
<th>SABRO CAP Alerting</th>
<th>FF Voice Alerting</th>
<th>FF Acknowledgement</th>
<th>FF Field-Observation report translation</th>
<th>Eden-SitRep create record</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time (mm:ss)</td>
<td>19:25</td>
<td>09:06</td>
<td>12:21</td>
<td>08:57</td>
<td>23:38</td>
</tr>
</tbody>
</table>
Canadian case of voice for situational awareness

Operations center patching through HF and SFU's MobComm truck to keep rescue teams aware
Work ahead for us

1. Improving CAP messaging with Sahan-Eden (GSoC 2012) better streamline the Voice-text alerting

2. Integrate Freedom Fone with Sahana to extend IVR and Voice-enabled last-mile interfaces for low skilled, voluntary, non-text savvy grassroots users

3. Improve localization for Sinhala/Tamil text entry with transliteration for quick typing and TTS capabilities

4. Sri Lanka National Disaster Management Center is implementing a call center with IVR capabilities; we will share research findings with them

Proposal, URS, SRS, evaluation methodology, technical report
See Project Page: http://lirneasia.net/projects/2010-12-research-program/ff4edxl/

Thank You