Useful and Easy-to-Use Interactive Voice for Emergency Data Exchange

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“Sarvodaya Samana Thetha”
Community-based Disaster Management Center
Emergency Information Needs

Situational Information Communication Procedure

- 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

Sarvodaya’s relief efforts continue

Sarvodaya is engaged in relief efforts in the wake of recent floods in the country. The organization is providing support for affected communities by providing essential needs such as food, clothing, and shelter. This includes distribution of relief items and assistance to affected families.

On February 10, 2022, Sarvodaya conducted a relief drive in affected areas. Volunteers distributed food, clothing, and other essential items to those in need. The organization worked closely with local authorities to ensure that aid was efficiently distributed.

After the floods, the Sarvodaya team continued its efforts by providing medical assistance and psychological support to the affected communities. The organization is committed to helping affected areas recover and rebuild.

For more information on Sarvodaya’s relief efforts and how to contribute, visit www.sarvodaya.org.
Sarvodaya use telephones to communicate, daily/weekly, IDP Info.
How can we help them do better?

functions

ALERTING

REPORTING

architecture

keep it Simple
Positioning Voice for Emergency Communication

- **Dropped calls** are high during hazard events
  - Voice best after the $N$th hour from disaster impact
  - Recommended for *disaster response phase* (rescue and relief)
  - Can be used for other none critical disaster management activities
- 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*
Decoupled Software Systems

- **Sahana Disaster Management System** (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)
  - 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

Need TTS/ASR
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
Formative Evaluation Method

Controlled Exercises
• Discussed operating procedures (goal, intention, action)
• Executed those procedures (execution, perceiving, interpreting SoW)
• Evaluated the outcomes (Performance, Usability)

Complexity:
• Interaction techniques (HCI)
• Reliability - mean time to completion & voice quality (ITU-T)

Usability:
• Human action cycle (HCI)
• Gulf of execution/evaluation (HCI - what system allows and understanding of SoW)

Utility:
• Ease-of-Use, Usefulness, and Attitude (TAM)
Sarvodaya Community Emergency Response Team Experience
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")

CERT Complexities Interacting with Freedom Fone to receive Alerts (n=37)
- Extremely easy or easy: 68.92%

CERT Number of Attempts to receive Alert from Freedom Fone (n=37)
- Two or less attempts: 85.94%
CERT members REPORTING Field Observations through Freedom Fone

**Menu selection sequence:**

1. Language (press #1 for sinhala)
2. Submit a Report (press #2 for reporting)
3. Begin recording after the beep
3. Save report (press # to save, press #1 to listen, press * to delete)

**Cert Complexities Interacting with Freedom Fone to submit Report**

- Extremely easy or easy: 43.57%
- Easy: 25.00%
- Moderate: 7.50%
- Difficult: 5.00%
- Extremely difficult: 10.00%

**Percentage of Users by District:**

- Colombo: 25.00%
- Matara: 10.00%
- Nuwara Eliya: 20.00%
- Ratnapura: 15.00%
- Grand Total: 100.00%

**Cert Number of Attempts to submit Report with Freedom Fone**

- > 03: 10.00%
- 3: 75.00%
- 2: 10.00%
- 1: 5.00%
- Two or less attempts: 86.42%

**Percentage of Users by District:**

- Colombo: 25.00%
- Matara: 10.00%
- Nuwara Eliya: 20.00%
- Ratnapura: 15.00%
- Grand Total: 100.00%

**Avg. Call Time:** 2:33 min
**Avg. Msg Time:** 1.38 min
General observations, CERT multiple attempts with IVR

• User who claimed Freedom Fone to be difficult had not been exposed to IVR prior to this; very much used to dial a number of occasional SMS

• Unlike mobile or computer application with display, IVR has no visual of transitions; hence, sometimes get lost in the menu trees

• Frustrations caused by unbranded cheap phones not interacting well (e.g. keypad entries not recognized)

• Forgetting to use special keys; e.g. press # key to commit a voice recording

• Some carriers not passing the DTMF signal through for IVR interactivity; menu options not recognized.

3G and above with VoIP can resolve all these
"All things considered, Freedom Fone, for alerting and reporting is a(n) ___________ idea"

"Present Sarvodaya methods are ad-hoc and informal unaccountable, but Freedom Fone stores a record of the story ... no one can say otherwise."
Sarvodaya Hazard Information Hub
Operators Experience
Mean Time to Completion

**Actions:**

- **MONITOR**
  - Get HazInfo [Email/SMS]
  - HIHO: create CAP msg [SABRO]
  - HIHO: alert CERT / HIHO [SABRO/FF]
  - CERT/HIHO: ack msg [SMS/FF]
  - CERT: send FOR [Call/FF]
  - HIHO: create SITREP [Eden-SitRep]
  - EM: derived 3R [Eden-SitRep]

**Paraphernalia:**
- Email
- Audacity®
- Freedom Fone
- Freedom Fone
- Freedom Fone
- 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>
Task sequence (Y-axis), time-series (X-axis), and duration (blurb volume)
**Task Transition Stability**

**Colombo:** Smoother but delayed because implementers did not fully test and configure the user's machine (i.e. technology failed on the day of the exercise.

**Matara:** Unsmooth lack of streamlining controls and having to use a decoupled systems
• Feedome Fone SITREP cumbersome translating and determining English disaster terms with diverse range of incident reports
• Frustrations with Web2Py and PHP disagreeing to coexist
• System services like Cronjobs interfering with system continuity
Conclusions

- Forget about Speech-To-Text or Text-To-Speech
  - TTS/ASR still in development for Sri Lankan local languages
  - GSM Voice quality too bad for automating transformation
  - FCC has suspended TTS for EDXL-CAP voice messaging
- VoIP quality is better (i.e. MP3)
  - Lookout for 4G voice broadcasts
  - may takes us closer towards automation with TTS/ASR
  - Don't need to invest in GSM modems (unreliable and expensive)
- Daily use of IVR in Sarvodaya business
  - Then it's always “on” and “ready to use”
  - Opportunity for CERT to improve their skills

More visit: http://lirneasia.net/projects/2010-12-research-program/ff4edxl/