The Accessibility of Wireless Emergency Communications: Updates from the Wireless RERC

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The 12th RESKO Technical Conference
KINTEX, Goyang, Korea
November 8th, 2018
Impact of Disasters on People with Disabilities

- Higher Injury and Mortality Rates
- Barriers to Evacuation
- Barriers to Communication
Wireless Emergency Alerts (WEAs)

- WEA are part of the US Government's Emergency Alert System
- Common Alerting Protocol (CAP)
- Geo-Targeting
- WEA Notification
EMERGENCY LIFELINES PROJECT

NOTIFICATION SIGNALS
Prototype Design & Development

- Developed a Prototype System to Evaluate Vibration, Sound, and Light as alerting signals for incoming WEA messages.
Usability Test Parameters

- Subjects were interviewed and exposed to each signal type in a quiet environment.
- Usability Testing in Simulated Environment.
- Forty-six subjects with sensory impairment participated over in 6 days
  - 20 subjects were deaf or hard of hearing
  - 22 subjects were blind or had low vision
  - 4 subjects were deaf–blind.
Response Time by Disability Type (Deaf & Hard of Hearing)

- Participants that were Deaf had the quickest response time to the low and medium vibrations, then the WEA light cadence.

- Participants that were Hard of Hearing had the quickest response time to the WEA Light cadence; high, medium and low vibrations; then the WEA sound.
Response Time by Disability Type (Blind & Low Vision)

- Participants that were Blind responded most quickly to the vibration signals.
- Participants that were Low Vision responded most quickly to the WEA sound and WEA All signals.
Summation

➢ The Fire Strobe and the high magnitude vibration were the most noticed signals.

➢ Vibration strength is a factor in response time to WEA messages, BUT the low vibration setting had the fastest response.

➢ Adding a WEA light cadence can increase response time to WEA messages for certain groups.

➢ Simultaneously activating all notification signals: sound, vibration and light, will increase timely receipt of WEA messages.

• Why? The majority of participants (74%) carry their phone in a location that could negatively impact their perception of incoming WEA messages (i.e., purse, bag, briefcase, pants or jacket pocket).
Prototype Development & Testing

- Software APP developed on Android Platform
- ASL Video & Symbology Included
- Usability Study
  - 22 Deaf Participants whose primary language was ASL
  - Received three, randomly selected test messages in different formats
  - Asked:
    - What id the message say?
    - What would you do if you received this message?
Prototype Message Components

![Image of mobile phone screens showing message components]

- Shelter in Place
- Hurricane Warning
- Tornado Warning
- Fire Warning

- SMS Text Alerts
  - Fire Warning in this area until 2115
  - Evacuation Immediate in this area until 2130
  - Check local media, #alert
  - Received 06/02/2016 02:05 PM

- SMS Text Alerts
  - Tornado Warning in this area until 1845
  - Monitor Radio Check Local Media, #alert
  - Received 06/02/2016 16:02:21 PM

- Civil Emergency Message in this area until
Results / Symbology

- 10% understood the entire text message by itself.
- Some of the symbols helped with text comprehension.

<table>
<thead>
<tr>
<th>Recognized Symbols</th>
<th>Interpreted Symbols</th>
<th>Unknown Symbols</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Flood Warning</td>
<td>Fire Alert: “Flame” (50%)</td>
<td>• Civil Emergency</td>
</tr>
<tr>
<td>• Hurricane Warning</td>
<td>Flash Flood: “Water is Rising” (40%)</td>
<td>• Evacuation Immediate</td>
</tr>
<tr>
<td>• Tornado Warning</td>
<td>Shelter in Place: “It’s a house” (60%)</td>
<td>• Hazardous Materials</td>
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<tr>
<td></td>
<td>Winter Storm: “Snow” (40%)</td>
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Results / ASL Video

- ASL Video was understood by all subjects
- Several subjects did not pay attention to the entire video.
- Participants recommendations to improve the video:
  - The video should start automatically
  - The video is too fast. Several subjects watched it more than once
Conclusions and Recommendations

- **Continued Education is Important**
  - None of the subjects understood that “All Clear” meant that the emergency was over – even when it was displayed to them in ASL.
  - Not all participants understood the message was geotargeted.

- **Symbols add to comprehension, but don’t provide the whole message.**

- **ASL Videos are understood by the group, but the message components should be reorganized for this population.**

- **ASL Video implementation should allow for replay.**
Contact and Connect

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