Challenges in Universally Usable Privacy and Security

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User diversity

- Disabilities:
  - Cognitive,
  - Physical,
  - Perceptual

- Age:
  - Seniors,
  - Children

- Knowledge related
Technology diversity

- Inputs:
  - keyboard and mouse,
  - Touch screen and stylus
  - Speech,
  - Head controlled,
  - Eye controlled,
  - Brain controlled...

- Outputs:
  - Visual,
  - Text to speech,
  - Non-speech sound,
  - Haptic...
Context of use

- Traditional home or office environment
- Ubiquitous/mobile environment:
  - Small or large display,
  - Small input devices,
  - Physical factors:
    - Vibration,
    - Lighting,
    - Noise,
    - temperature…
  - Social factors
    - How many people are around?
    - Who are around?
Universally usable privacy and security

- Security and privacy mechanisms or tools usually demand users to see more, learn more, and do more
  - Additional information (security indicators)
  - Additional task (email encryption)
  - Harder task (passwords, CAPTCHA)

- Security and privacy mechanisms or tools usually raise accessibility barriers
<table>
<thead>
<tr>
<th></th>
<th>Visual disability</th>
<th>Physical disability</th>
<th>Cognitive disability</th>
<th>Children</th>
<th>Seniors</th>
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</thead>
<tbody>
<tr>
<td><strong>Traditional password</strong></td>
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<td></td>
<td>Difficulty in management</td>
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<td>Difficulty in management</td>
<td>Difficulty in input</td>
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<tr>
<td><strong>Graphical password</strong></td>
<td>Inaccessible</td>
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<td>Difficulty in input</td>
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<tr>
<td><strong>Visual CAPTCHA</strong></td>
<td>Inaccessible</td>
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<td>Difficulty in input</td>
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<tr>
<td><strong>Audio CAPTCHA</strong></td>
<td>Hard to use</td>
<td>No need</td>
<td>No need</td>
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<td>Hard to use</td>
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<td><strong>Anti-phishing tools</strong></td>
<td>Inaccessible</td>
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<td>Hard to understand</td>
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<td><strong>Anti-spam tools</strong></td>
<td>Hard to use</td>
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<td><strong>Security/Privacy</strong></td>
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<td>？</td>
<td>Hard to understand</td>
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</tr>
</tbody>
</table>
Anti-phishing tools

- Anti-phishing tools depend on both site content and cues available in the browser.

- Many elements and visual cues are inaccessible to screen reading software.

- Anti-phishing tools or features may be hard to understand for individuals with cognitive disabilities, children, and the seniors.
Passwords

- Users with cognitive disabilities may find it hard to understand the password mechanism, remember the passwords, and manage multiple accounts.

- Users with visual disabilities have difficulty managing passwords.

- Users with physical disabilities that hinder the use of keyboard and mouse have difficulty entering strong passwords.
CAPTCHAs

- Visual CAPTCHAs are inaccessible to users who are blind or users with specific cognitive disabilities such as aphasia.

- Audio CAPTCHAs may be accessible to blind users but not easily usable due to:
  - Intentionally introduced noise
  - Variety of voices
  - Design

http://www.nswardh.com/shout/
Go back to nswardh.com

Shout It Out!

(New version! » Download Audio & Visual CAPTCHA v1.3 for PHP)

This is just a demo on how the Audio & Visual CAPTCHA works

Name: test

Message: test

Please enter the code below!
If you have difficulties reading the code, move your mouse over the speaker and a female voice will read it for you.

Code: (Just to verify that you’re not a spambot!)

Shout It!
Possible approaches for universally usable privacy and security

- User diversity
  - Providing alternative forms of content
    - May provide curb effect
    - May incur high development and maintenance cost
  - Development of a single system that are accessible by diversified populations

- Gaps in user knowledge
  - Development of easily understandable vocabulary and iconography
  - Transparent system actions
  - Better training

- Technology diversity
  - Consideration for small display
  - Consideration for small input devices
Thank you