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

	Visual disability	Physical disability	Cognitive disability	Children	Seniors
Traditional password	Difficulty in management	Difficulty in input	Inaccessible ?	?	Difficulty in management
Graphical password	Inaccessible	Difficulty in input	?	?	?
Visual CAPTCHA	Inaccessible	Difficulty in input	?	?	√
Audio CAPTCHA	Hard to use	No need	No need	No need	Hard to use
Anti-phishing tools	Inaccessible	√	Hard to understand	?	?
Anti-spam tools	Hard to use	√	?	?	?
Security/Privacy configuration	Hard to use	√	Hard to understand	Hard to understand	Hard to understand

Anti-phishing tools

- Anti-phishing tools depends 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

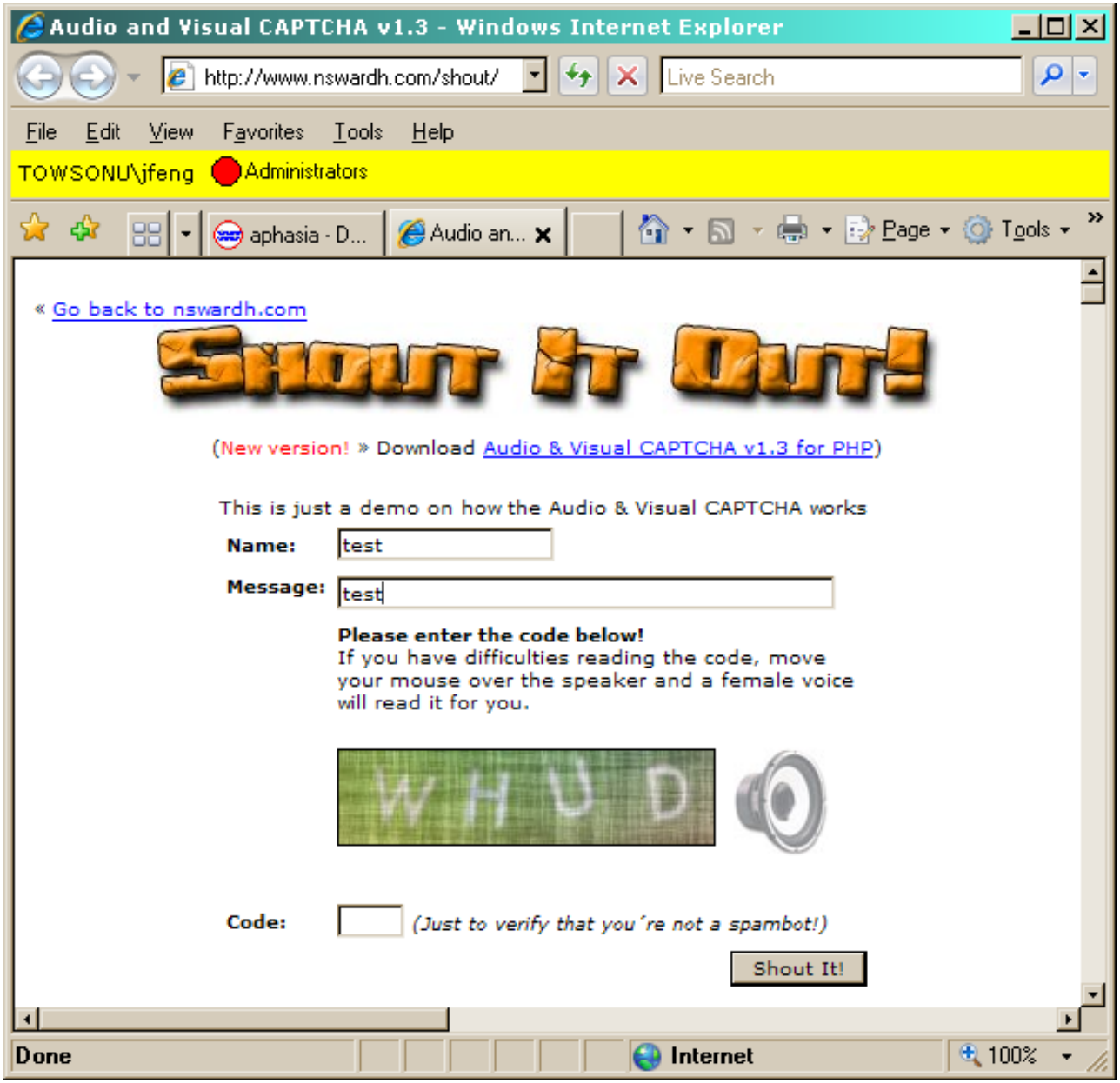
- Users with cognitive disabilities may find it hard to understand the password mechanism, remember the passwords, and manage multiple accounts
- Users with visual disabilities have difficulty managing passwords
- Users with physical disabilities that hinder the use of keyboard and mouse have difficulty 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/


Audio and Visual CAPTCHA v1.3 - Windows Internet Explorer
http://www.nswardh.com/shout/
Live Search
File Edit View Favorites Tools Help
TOWSONU\jfeng Administrators
aphasia - D...
Audio an...
Page
Tools
« 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.
W H U D
Code:
(Just to verify that you´re not a spambot!)
Shout It!
Done
Internet
100%

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