EAC Accessibility Grants: Leveraging Cutting Edge R&D in Next Generation Standards

Shaneé Dawkins, Ph.D., dawkins@nist.gov
National Institute of Standards and Technology

Patrick Leahy, PLeahy@eac.gov
U.S. Election Assistance Commission
Accessible Voting Technology Initiative

- In 2009 & 2010, Congress appropriated $8M to the EAC to improve voting accessibility for all citizens
  - Created a 3-year R&D competitive grant competition
- 2010 EAC AVTI grant program
  - 2010 – Military Heroes Initiative
  - 2011 – Intermediary Grants
    - Information Technology and Innovation Foundation (ITIF)
      - Two rounds of sub-grants
    - Research Alliance for Accessible Voting (RAAV)
      - Clemson University and their coalition partners
AVTI Research

• Focus
  • Current state of elections: voter surveys & information gathering
  • Voting technology design & prototyping
  • Best practices, guidelines, & recommendations

• Impact on Voters
  • Less than half of the 35 million eligible voters with disabilities voted in 2012 due to physical, intellectual, educational, and political barriers in elections
  • R&D benefits voters with communicative, physical, and cognitive disabilities

• Major Funded Projects
  • Military Heroes Initiative
  • Prime III
  • Anywhere Ballot
EAC AVTI Funded R&D

- Apps4Android
- Association of Assistive Technology Act Programs (ATAP)
- Carnegie Mellon University, Silicon Valley (CMU-SV)
- Center for Information Technology Research in the Interest of Society (CITRIS)
- Clemson University
- Election Center
- Election Data Services
- Georgia Tech Research Institute (GTRI)
- GT Center for Assistive Technology and Environmental Access (CATEA)
- Michigan State University
- OpenIDEO Innovation Challenge
- Operation BRAVO Foundation
- Paraquad, Inc.
- Rutgers University
- Tennessee Disability Coalition
- UC, Berkeley Election Administration Research Center (EARC)
- University of Baltimore
- University of Colorado Denver Assistive Technology Partners (ATP)
- University of Maryland, Baltimore County (UMBC)
- University of Utah
- University of Washington Center for Technology and Disability Studies (UWCTDS)

Over 45 R&D Innovations & Solutions

Improving U.S. Voting Systems

TGDC Meeting
July 20 – 21, 2015
State of Accessibility in Elections
Voter Participation

- 15.6 million people with disabilities reported voting in the November 2012 elections
  - 5.7% less than turnout for voters without disabilities
  - 2.3% fewer people with disabilities registered to vote than people without disabilities
- Notable barriers to participation
  - Insufficient accessibility in voting booths and voting system design
  - Complex instructions and poor ballot design

Sources
Voter Experiences

- **2012 Election Survey**
  - More than 30% of voters with disabilities had difficulty voting at the polling place
    - Vs. 8% for voters without disabilities
  - 30% of voters with disabilities needed assistance in the polling place
    - Vs. 11% for voters without disabilities
  - 58% of voters with disabilities would still prefer to vote at polling place
    - 25% would prefer vote-by-mail vs. 14% voters without disabilities

**Sources**
Technology Review

- Common accessible voting system features
  - Enhanced visual display
    - e.g. large font option, color contrast option
  - Speech output
    - e.g. read words displayed on screen, speech tempo option, volume adjustments
  - Tactile keypad input
    - Alternative to touchscreen input
  - Switch input (dual)
    - e.g. sip and puff, rocker

Sources
ATAP: http://www.ataporg.org/docs/RAAV%206.27.13%20publish.pdf
TRACE: http://trace.wisc.edu/ez/
Military Heroes Project
Military Heroes Project

- Research voting technology and processes for military service members who sustained disabling injuries in combat
  - Multiple and overlapping physical, emotional, and social issues
- Determined challenges for recently injured military personnel
- Developed recommendations for election administrators and election system designers

Source
ITIF, GTRI, & the Operation BRAVO Foundation
http://elections.itif.org/resources/resources-voting-for-veterans-with-disabilities/
Military Heroes Project

- Recommendations for election administrators
  - Accessible absentee VS in rehabilitation facilities
  - Communication and coordination between the VA medical facilities and local election officials
  - Make accessible voting information available
  - Streamline the process for obtaining absentee ballots
  - Relax local ballot design requirements
  - Make ballot data available in electronic format
  - Pursue innovative technology

Source
GTRI: http://elections.itif.org/resources/resources-voting-for-veterans-with-disabilities/
Military Heroes Project

- Guidance for election system designers
  - Systems must be flexible, portable, and have options for various personal assistive technology (PAT)
- Technology recommendations
  - Improve ballot interfaces
  - Screen magnifiers
  - Adjustable contrast and brightness
  - Speech output
  - Speech recognition
  - Touchscreens
  - Mobile devices
  - Eye or head tracking technology

Source
GTRI: http://elections.itif.org/resources/resources-voting-for-veterans-with-disabilities/
Voting Technology
Interaction Design: iPad Use

- Using iPads in minimum care residence facilities
  - 34% of participants had significant problems using the touchscreen
  - More than half of participants were unable to display number keys
- Recommendations
  - Use a stylus
  - Use stand with appropriate angle
  - Provide clear instructions on gesture interaction

Source
Interaction Design: Enhanced iPad

Source
Interaction Design: Joystick Input

- Smart voting joystick
  - Dual-axis joystick with auditory and haptic feedback
  - Designed for voters with motor & dexterity impairments

Source
Interaction Design: Tactile Input

- Designed for Older Adult Voters with Arthritis
- 2-button (advance forward and select)
- 3-button (with backward)
- 5-button (with next and previous contest)

Research Prototypes: Prime III

- Universally designed, private, secure, multimodal voting system
- Demo: https://hxr.cise.ufl.edu/PrimeIII/
  - Access code: 0000
- 2013 Prime III & Balloting Demo
  - http://youtu.be/bM5DKP4c4aw
- 2014 Demo with intelligent OCR and automatic paper handling
  - http://youtu.be/YPorhOMzaKk

Source
http://primevotingsystem.org/
Research Prototypes: Anywhere Ballot

- Online ballot marking prototype
- Plain Language and Plain Interaction
  - Designed for voters with low literacy skills or mild, age-related cognitive impairment
- Demo: http://anywhereballot.com/
- Design principles: http://civicdesign.org/projects/anywhere-ballot/
Research Prototypes: EZ Ballot

- Designed for voters with cognitive, visual, and dexterity limitations

Source
R&D in Elections: Bridging the Gap

- The gap
  - Performing cutting edge elections research
    - Academic Institutions
    - Civil Organizations
    - Independent Researchers
  - Developing and managing elections systems
    - Vendors
    - Election Officials

- The bridge
  - Continue piloting new technology in state & local elections
  - Integrate new technology & design into elections systems development processes
  - Employ use of usability & accessibility interface and interaction best practices in election system design
  - Usability & accessibility roadmap for next generation standards
Questions?

Accessible Voting Technology Portal
nist.gov/itl/vote/accessiblevoting
Prior to Voting

- Voter Information Guides
  - Researched designing guides for voters with aphasia, traumatic brain injury, and Alzheimer’s
- Design strategies for written and electronic content
  - Present content in text, images, and speech
  - Simplify, highlight, and isolate key points
  - Divide dense text into short, readable paragraphs
  - Rephrase content for maximum comprehension
  - Provide accurate sample ballots

Sources
Prior to Voting

• Poll worker training
  • Why?
    • Poll workers do not know of available accommodations
    • Poll workers are not familiar with accessible voting equipment
  • Current training is 1-2 hours of PowerPoint lectures
    • Hands-on training is difficult to implement for election officials

• Training methods
  • Codesigned training materials and best practices
    • Election Day Picture Guide
  • National online training course
    • http://www.accessiblevoting.gatech.edu/

Sources
Paraquad & TDC: http://www.nist.gov/itl/vote/accessiblevoting/
Prior to Voting

- Voter outreach
  - Long term care facilities
    - Teams of Election Officials visit residents
    - Pilot studies resulted in recommendations for Election Officials
  - Voting system demonstrations
    - Via state AT programs
    - 54% of participants have experience with AT
      - Less than 10% have experience with AT used in voting
    - Demos improved voter comfort with accessible voting systems

Sources
ATAP: http://www.ataporg.org/voting.html