Progress on the roadmap for usability and accessibility of next generation elections-2015-2018

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In this report

The Roadmap, published in July 2015, was developed through a collaboration between NIST and the Center for Civic Design, under grant 70NANB14H280 from the U.S. Department of Commerce, National Institute of Standards and Technology. Project site: https://civicdesign.org/projects/roadmap/

Overview

In 2015, the Roadmap for usability and accessibility of next-generation elections identified 6 priority areas for improvement with specific recommendations for meeting those goals.

1. Support the design process
2. Engage voters effectively
3. Address the entire voter journey
4. Support evolving technology
5. Provide useful guidance and standards
6. Improve testing in design and certification

This update on progress looks at what has happened in each of the priority areas. In both the work by NIST and the EAC, and in the broader world of elections and elections technology, there has been significant activity towards these goals.

This report is not exhaustive, but a chance to reflect on the progress towards usable and accessible voting systems.

The original report and other materials are available at:
https://civicdesign.org/projects/roadmap/

About the roadmap

In 2015, we created a roadmap to help the NIST voting project team look forward to its work on the Voluntary Voting Systems Guidelines (VVSG) 2.0. The roadmap included a history of work towards accessible and usable voting systems, and explored how to achieve the goals of the Help America Vote Act (HAVA) requirements for independent and private voting for all voters.

Keeping up with changes in the state of the art and technology for voting systems, as well as public expectations about how voters will participate in elections required a new approach to usability and accessibility guidance for election systems.

Despite 12 years of work on election standards for usability and accessibility, the reality is that there are still many barriers. To understand the elections context in which voting systems and voting systems standards would operate, the work on the roadmap looked beyond the standard to the entire world of election information, processes, procedures, people, and systems and how they work together.

How the roadmap was created

The roadmap was created by reviewing current research on voting systems and consulting with stakeholders such as the Election Assistance Commission, state and local election officials, system vendors, researchers, and others about the need for better guidance for usability and accessibility of future election systems. We sought out diverse viewpoints from experts including election officials, researchers, system designers, policy experts, and disability advocates.

Three important concepts were used in the roadmap:

- **Organizing requirements by principle**, now the framework for the VVSG 2.0
- **A focus on the entire voter experience journey**, including preparation for voting, getting to the "polling place"
- **A framework for layers guidance**, placing the VVSG requirements into a larger ecosystem of information, guidance, best practices, and other advice

In particular, accessibility and usability advocates stressed the need using modern user-centered design and Universal Design approaches to designing a voting system, and better training for and feedback from voters with disabilities.

The Roadmap Priority Areas

Priority Area 1: Support the design process

1.1 Design standards and guidance so they are easier to use
1.2 Share best practices and techniques that meet human factors goals
1.3 Create educational programs on human factors for system designers
1.4 Create guidance on effective design processes
1.5 Make data available to analyze and improve the voter experience

Priority Area 2: Engage voters effectively

2.1 Create guidance on effective election communication and personalization
2.2 Make voter education available to everyone, including practice with real voting systems
2.3 Improve voter guides, making them more usable and accessible

Priority Area 3: Address the entire voter journey

3.1 Support voters as they move between election systems
3.2 Create a risk model that includes human factors and security
3.3 Enable "anywhere voting"

Priority Area 4: Support evolving technology

4.1 Use universal design to create systems that work for more voters
4.2 Enable the use of personal devices and assistive technology to vote
4.3 Update voting guidance to address new technologies and interactions
4.4 Create guidance for election systems outside of the "voting system"

Priority Area 5: Provide useful guidance and standards

5.1 Apply both usability and accessibility to all systems in VVSG and other guidance.
5.2 Simplify guidance by focusing on principles
5.3 Develop performance metrics
5.4 Develop process standards

Priority Area 6: Improve testing in design and certification

6.1 Improve ways to test systems, including pilot testing as part of certification
6.2 Certify open, component-based election systems
6.3 Establish qualifications of human factors evaluators

1. Support the design process

1. Design standards and guidance so they are easier to use
2. Share best practices and techniques that meet human factors goals
3. Create educational programs on human factors for system designers
4. Create guidance on effective design processes
5. Make data available to analyze and improve the voter experience

Work at NIST

Work on the Voluntary Voting System Guidelines (VVSG 2.0):

- Re-organized the standard into meaningful election principles
- Edited the entire standard for plain language, with a consistent template and tagging structure
- Revised and updated the existing usability guidance materials and restructured them to map to the requirements

Researching and sharing best practices:

- Used a collaborative approach in the Human Factors Public Working Group including both advocates and vendors
- Developed a usability test method and checklist for the usability of electronic poll books

Educational programs:

- Updated the guidance on usability and universal design
- Developing educational webinars on human factors for system designers (planned for summer 2019)

Related work

- New generation voting systems have raised the level of both usability and accessibility through best practices and more robust UCD approaches
- The Los Angeles Voting Systems for all People (LA VSAP) project to develop a new voting system followed a model UCD process
- ElectionTools.org (and related in-person classes) include both usability testing and accessibility for election officials creating voter outreach materials
- The MIT Election Data Science Lab has created analysis tools to determine the number of voting systems needed for predicted turnout and voter arrival patterns using data collected by hand and through voting system logs
- At several universities, work on polling place lines (and how to prevent them) includes both data collection through observation or voting tech, and research on ways to design voting systems to speed ballot marking.

2. Engage voters effectively

1. Create guidance on effective election communications and personalization
2. Make voter education available to everyone, including practice with real voting systems
3. Improve voter guides, making them more usable and accessible

Work at NIST

Work on this priority area is not a direct part of the scope of work at NIST, but there are follow-on projects that connect directly to research funded by the EAC/NIST:

- A sample ballot and information transfer system concept based on EAC-funded Accessible Voting Technology Initiative (AVTI) research is part of a commercial voting system and incorporated into LA VSAP.
- The plain language guidelines and election worker usability testing in VVSG 1.0 and 1.1 have led to improved documentation for election workers for setting up and running voting systems, including setup of assistive technology for voters with disabilities.

Related work

- ElectionTools.org provides teaching tools with the goal of spreading effective election communication and voter outreach.
- Center for Civic Design worked with the Future of California Elections to do research and create templates for usable voter guides.
- Online voter guides with information about candidates and questions are in wider use, with both commercial products and sites built by election jurisdictions.
- The VSAP Interactive Sample Ballot uses the same interaction as the voting system, serving as an educational tool.

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3. Address the entire voter journey

1. Support voters as they move between election systems
2. Create a risk model that includes human factors and security
3. Enable "anywhere voting"

Work at NIST

- The roadmap includes a map of the voter journey showing the people, processes, and systems that support voters at each stage of the elections process.
- A NIST-funded project created principles for secure and accessible remote ballot marking.
- The EAC held a summit on security and accessibility in 2017.

Related work

- There has been an increase in state election models based on vote-by-mail and vote centers in western states (including Washington, Oregon, California, Utah, and Colorado), and less restrictive requirements for vote-by-mail.
- 38 states and the District of Columbia offer online voter registration.
- National attention to security includes "table top" security exercises that involve all state and local officials in reacting to potential events.
- New systems to serve uniformed and overseas voters offer electronic blank ballot delivery, digital ballot marking tools, and ways to return a marked ballot.
- Several states, including Oregon, Ohio, Maryland, and California began using systems to allow people with disabilities to mark a vote-by-mail ballot using a remote ballot marking device.

4: Support evolving technology

1. Use universal design to create systems that work for more voters
2. Enable the use of personal devices and assistive technology to vote
3. Update voting guidance to address new technologies and interactions
4. Create guidance for election systems outside of the "voting system"

Work at NIST

- NIST-funded project on usability of electronic pollbooks with a landscape analysis, usability testing plan, and checklist
- NIST-funded project on accessible remote ballot marking
- Expanded VVSG requirements to meet the needs of new systems and more universal design
- NIST-funded paper on assistive technology in the polling place
- VVSG 1.1 added requirements to allow voters to use their own switch assistive technology for navigation and marking

Related work

- Products to provide overseas voters with ways to download blank ballots and ways of interacting with a ballot on a personal device.

5: Provide useful guidance and standards

1. Apply both usability and accessibility to all systems in VVSG and other guidance.
2. Simplify guidance by focusing on principles
3. Develop performance metrics
4. Develop process standards

Work at NIST

- VVSG reorganized into principles for good elections. The Human Factors Public Working Group (HF PWG) took the lead in analyzing Chapter 3 of VVSG 1.1.
    - Fewer requirements – able to combine and simplify
    - Easier to understand goal of a detailed technical requirement when it's given context within a principle
- New user-centered design process requirement added under Principle 2 – High Quality Implementation

Related work

- Work on polling place management at the MIT Election Data Science Lab is used to create modeling tools to ensure that there are enough voting stations to meet goals of wait times less than 30 minutes

6: Improve testing in design and certification

1. Improve ways to test systems, including pilot testing as part of certification
2. Certification of open, component-based election systems
3. Establish qualifications of human factors evaluators

Work at NIST

- NIST and a public working group took over development of a Common Data Format (CDF) specification for voting system information
- EAC is working on ways to retest a system with new components more rapidly
- Updated qualifications for human factors evaluators
- Research to identify tools for testing plain language that would also help vendors write more understandable instructions and messages

Related work

- LA VSAP using pilot testing in mock and real elections creating a model for introduction of a new voting system
- State certification information exchanges
- Certification including accessibility testing in Pennsylvania
- Several new voting systems incorporate COTS parts like the main tablet interface

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Timeline: 2014 - 2018

When	What	Details
December 2005	VVSG 1.0	The EAC unanimously adopted the 2005 VVSG, which significantly increased security requirements for voting systems and expanded access, including opportunities for individuals with disabilities to vote privately and independently.
January 2014	Report	*The American Voting Experience* - Report and recommendations of the Presidential Commission on Election Administration PCEA) released.
October 2014	Roadmap Workshop	Work begins on the Roadmap with a workshop of 32 election officials, voting system designers, researchers, and voter advocates, who worked on answers to: "What will the experience of elections be like in the future?"
November 2014	NIST Research Report	*Designing Electronic Ballot Interfaces for People with Low Literacy* report by University of Baltimore released.
January 2015	Roadmap Workshop	A second workshop included 20 people - again a balanced group – who looked at how the guidance and certification process can be improved, and asked, "What objectives can help us meet the goals of usable and accessible elections?" First draft of the voter journey reviewed.
February 2015	Roadmap Report	The preliminary Roadmap and Voter Journey Map was presented at the Future of Voting Systems Symposium.

When	What	Details
February 2015	Roadmap Workshop	A workshop of attendees at the Future of Voting Systems Symposium reviewed the objectives and provided input on their priorities.
March 2015	VVSG 1.1	The EAC Commissioners: • approved the VVSG 1.1 which clarified the guidelines to make them more testable; • enabled the National Institute of Standards and Technology *(NIST)* to create test suites for the proposed revisions; and • improved portions of the guidelines without requiring massive programmatic changes.
June 2015	EPB Workshop	Workshop on electronic pollbooks (EPB) usability held at IACREOT meeting: • collected comments on the work in progress • learned about developments in the field.
July 2015	VVSG 2.0	Work began to reorganize all of the requirements in Chapter 3 – Usability and Accessibility in VVSG 1.1 into a single structure, and to identify unifying principles. This analysis also mapped WCAG/508 legal accessibility requirements to the VVSG requirements.
October 2016	RBM Workshop	Workshop with 16 experts in voting security and accessibility held at the National Federation of the Blind to identify principles for secure and accessible remote ballot marking (RBM) tools.

When	What	Details
November 2015	EPB Pilot	Pilot test of electronic pollbooks usability testing plan was conducted (with outside funding for this portion of the project).
February 2016	EPB Report	Report on usability of electronic pollbooks with usability testing plan and checklist was released.
February 2016	VVSG 2.0 White paper	White paper on structure of the VVSG 2.0 usability and accessibility requirements incorporating suggested principles from NASED was released. Additional refinements were made until April 2016.
March 2016	RBM Presentation	Principles for remote ballot marking systems were presented at Election Verification Network.
April 2016	EAC Meeting	Presentation and report on organizing voting systems requirements by principles discussed at the EAC Standards Boards.
May 2016	VVSG 2.0 HF-PWG	Work begins with the Human Factors Public Working Group on a gap analysis of the VVSG 1.1 usability and accessibility requirements.
July 2016	Roadmap Report	Final version of the Roadmap was released.
September 2016	EAC Meeting	Technical Guidelines Development Committee (TGDC) meeting discussed progress in the Public Working Groups.

When	What	Details
December 2016	VVSG 2.0 White papers	Five white papers on design issues for VVSG 2.0 were released, covering issues uncovered in the gap analysis • Text size • Text color and contrast • Scrolling on a ballot • Navigation from the review screen • Assistive technology in the polling place
December 2016	VVSG 2.0 Workshop	A 'design studio' workshop with 16 user experience, interaction design, and animation professionals explored ways to support voters in making selections in vote-for-N contests in a digital ballot marking system.
February 2017	EAC Meeting	Technical Guidelines Development Committee (TGDC) meeting discussed progress on the VVSG 2.0 gap analysis and proposed principles.
March 2017	EAC Meeting	Proposed structure for organizing the human factors and privacy requirements into principles was presented to the Standards Board.
March 2017	RBM Report	Final version of principles for remote ballot marking systems was released.
May 2017	EAC Meeting	EAC Meeting on security and accessibility was held.
July 2017	VVSG	Date when all new voting systems must be tested against the VVSG 1.1
July 2017	VVSG 2.0 HF-PWG	Human Factors Public Working Group begins gap analysis of the usability and accessibility requirements in the new structure.

When	What	Details
September 2017	EAC Meeting	Technical Guidelines Development Committee (TGDC) meeting adopts the VVSG 2.0 principles and guidelines.
October 2017	VVSG 2.0 HF-PWG	Work begins drafting VVSG 2.0 Principles 5-8 – the usability and accessibility sections – and reviewing them with the Human Factors Public Working Group.
February 2018	VVSG 2.0 HF-PWG	First full draft of VVSG 2.0 Principles 5-8 was distributed to the Human Factors Public Working Group. Additional drafts released approximately every 3 months as review and drafting work continued with bi-weekly meetings until the end of the year.
May 2018	VVSG 2.0	Work on plain language editing for the glossary begins.
August 2018	VVSG 2.0 HF-PWG	Guidance briefs on user-centered design, usability testing with voters, usability testing with poll workers, and the Common Industry Format (CIF) for Voting test reporting template was released to the Human Factors Public Working Group.
September 2018	Report	*Securing the Vote: Protecting American Democracy* was released by the National Academies of Sciences, Engineering, and Medicine.
November 2018	VVSG 2.0 HF-PWG	Final open-issues list distributed to the Human Factors Public Working Group to begin final work on drafting of VVSG 2.0 Principles 2.2 and 5-8.
December 2018	VVSG 2.0	Work begins on the overall template for the VVSG 2.0 requirements and plain language editing for all sections.