Remote Ballot Marking Systems

Designing for usability, accessibility and security

Notes from the October 9, 2015 meeting

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Project site
http://civicdesign.org/projects/remote-ballot-marking/

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About this project

This project addresses an objective in the **Roadmap for Usability and Accessibility in Future Voting Systems**. Objective 3.2 calls for best practices to maximize usability, accessibility, and security by considering human factors and security together.

This project focused on remote ballot marking systems. These systems deliver a blank ballot for a voter to mark electronically, print, and cast by returning the printed ballot to the elections office.

Our goal is to investigate and propose principles and guidelines for the complete “voter journey” in using any remote ballot marking systems, looking at the election administrative procedures, technical systems, communications needs, and accessibility features that support voters through the process.

http://civicdesign.org/projects/roadmap/

Why work on remote ballot marking systems?

We chose remote ballot marking systems as the scope for this project because:

- There is a growing number of these systems, originally intended designed for UOCAVA voters, but expanding to use by voters with disabilities or even any voter who wishes to use them.
- There are advantages for all voters in using a ballot marking system for usability and accuracy.
- There is a need for guidance about how to make these systems accessible.
- There is disagreement about how to create these tools in a way that supports best practices in election integrity coupled with ease of use.
- They are similar in function to ballot marking devices covered by the VVSG.

Input from technical experts

The first activity was a working session, held on October 9, 2015 at the National Federation of the Blind.

A group of invited technical experts in election adminstration, accessibility, election technology, and election integrity provided input on design requirements for remote ballot marking systems.

The goal of the working session was to gather initial input on designing these systems, including:

- Benefits to different kinds of voters
- Barriers or drawbacks to implementing these systems to election administrators, voters, and system developers
- Areas of agreement or disagreement about how to design these systems for good election integrity

As we develop best practices, we will reach out to other experts and stakeholders for additional input.

Invited Experts

The group included experts in election administration, technology, systems design and access for people with disabilities.

- Jennifer Morrell, Arapahoe County, CO
- John Dziurlaj, Ohio Secretary of State's Office
- Ricky Hatch, Weber County, Utah
- Steve Booth and Lou Ann Blake, National Federation of the Blind
- Ted Jackson, Centers for Independent Living
- Claudia Acemyan, Rice University (STAR Vote)
- John Schmidt, Five Cedars (Oregon Alternative Ballot)
- Jared Marcotte (former Pew and Voting Information Project)
- Ron Bandes, Carnegie Mellon University
- Joe Kiniry, Galois
- Susannah Goodman, Common Cause
- Susan Greenhalgh, Verified Voting
- Jessica Myers, Election Assistance Commission
- Andy Regensheid and Ben Long, NIST

Activitities during the day

- Introductions, goals, and first thoughts from everyone
- Introduction to the Voter Journey
- Small group activity: what are the boosts (benefits) and drags (obstacles) in implementing remote ballot marking, and where do they occur in the voter journey
- Readouts and discussion
- Small group activity: starting from an issue (drag), try to identify solutions that solve the problem while maximizing boosts
- Readouts and discussion
- Identify possible principles or broad requirements embodied in the solutions
- Final wrap up: new ideas, surprises, or new learning

Opening thoughts

The group's opening thoughts reflected the range of experience and perspectives in the room. A summary of the themes expressed:

Technology in elections

- How does election technology reflect popular tech culture?
- How can we make it easier for voters to interact with new systems?
- How can we make election systems more accessible?

Accessibiity + Privacy + Security

- How do we find an acceptable level of security with accessibility?
- Can we make voting by mail really accessible?
- How can we minimize personal information (PII) for better privacy?

Improving participation

- Does convenience really translate to participation?
- How can we remove barriers?

Issues in election administration

- What ethics and design training do election officials need for new systems?
- How can we make remotely marked ballots work with the county tabulation system?

- Can we have it all?

Benefits to remote ballot marking systems (1)

"Boosts" or benefits of these systems identified in small group exercise.

A better experience

- The comfort of voting in your pajamas
- More independence and better technology for voters with disabiltiies
- No time pressure while voting
- Faster and easier to use your own assistive tech

Improves voter confidence, accuracy

- Confidence ballot marked as intended
- More control of privacy
- Ballot tracking systems mean you know your vote was cast
- Detects and warns of errors, and overvotes

More flexibility for personal needs

- Vote anywhere
- Voters have more choice of when and how to vote
- No worries about missing work
- Easier for people with disabilities that affect mobility or travel
- Safety can be an issue for some
- Benefits for voters with cognitive, dementia, or other medical issues

More informed voters

- Can take time to research vote choices
- Can stop while voting if needed to read about choices

Benefits to remote ballot marking systems (2)

"Boosts" or benefits of these systems identified in small group exercise.

Technology advantages

- Error correction and "second chance" for absentee voters
- Technology can be more accessible than existing options
- Needs to work to standards both for users and election interoperability
- Meets desire for new technology in voting
- May bring diversity of technology (laptop, tablet, mobile) – may be more accessible, and reaches wider audience
- Opportunity for encryption

Election administration benefits

- Cost reduction, fewer polling places
- Fewer poll workers needed
- Easier to remake a ballot, or avoid remaking entirely.
- Avoids problems of accessible voting systems that don't work well

Drawbacks or dangers to remote ballot marking (1)

"Drags" or barriers and dangers of these systems identified in small group exercise.

Problems for voters

- Cost of postage, difficulty getting to a post office
- Packing the ballot is hard without the official envelopes
- Need to be able to test system for compatibiity with your technology

Technical challenges

- Requires access to technology
- Requires digital literacy
- Instructions may not be clear
- Technical support can be difficult
- Risk of software bugs, incompatibility

Voter authentication and coercion

- Harder to ensure authentication of voters for correct ballot
- Unsupervised voting opens door to coercion, fraud, and bribery
- Who do you trust to help you – might change your votes
- Signature verification process is more difficult

Verification

- Verification may be difficult or not meaningful for visually impaired voters
- Cannot verify how ballot is cast

Drawbacks or dangers to remote ballot marking (2)

"Drags" or barriers and dangers of these systems identified in small group exercise.

Election administration

- It's another type of ballot to manage, with distribution and validation issues
- Handling non-standard ballot sizes
- Adds technical requirements for the election office
- Adds requirements to provide technical support for voters

Policy and legal

- Is this available to all voters
- Requires policy changes
- Is postal delivery reliable?
- Does it create bias or unequal access

Technical risks

- Availability of the system in busy election period for load or DOS attacks
- QR and bar codes introduce risks
- Malware and other attacks
- Unreliable ballot delivery
- Compatibility with a wide variety of untested hardware and software
- Vulnerable to power failures

Social issues

- No "I voted" sticker
- Danger of phishing, and social coercion
- Privacy and "voting parties"

Adding to the voter journey (1)

As the groups presented their work, we collected new ideas for addition to the voter journey.

Journey steps: Preparing to vote / learning about remote ballot marking

- What are the critical dates?
- Who can use the system?
- Are all the forms and the ballot accessible?
- Can voters have an option for the level of review and verification they want?
- Instructions and prompts must explain the system privacy and security features clearly.
- Are there sample ballots for voters to use for practice and to check accessibility (just like paper sample ballots)?

Bigger questions for election administration and voter communication:

- How do we manage introductions of a new system in the local election culture?
- What is the voter education path from old to new systems?

Adding to the voter journey (2)

As the groups presented their work, we collected new ideas for addition to the voter journey.

Journey steps: Getting the ballot

- How do voters get access to the system: link in a personal email? go to the site and enter an address?
- How is the ballot received: email, download link, USB or other media?
- What information is needed to provide the correct ballot style? Voter identification? Just an address?

Bigger questions for election administration and voter communication:

- When in the process is the voter authenticated?
- How can voters be sure that their information is protected beyond the use in an election (voter records are also public records)?
- How can we minimize the hurdles to getting a ballot while making sure everyone gets the right ballot?
- How can the system be designed and developed to support the widest range of hardware platforms, operating systems, and other technology?

Adding to the voter journey (4)

As the groups presented their work, we collected new ideas for addition to the voter journey.

Journey steps: receiving the ballot at the elections office

- How can the ballot returned by the voter be designed so that it can be handled easily and directly?
  - Voter identification in a code similar to labels on printed VBM ballots for rapid check-in
  - Tabulate directly from the returned ballot, with no remaking, either through OCR or an auditable code
  - Preserve meaning across all formats

Thoughts about designing for election integrity

- Each decision about the system cascades through the whole design.
- The system design should support redundancy and fail safes, reducing single points of failure.

Adding to the voter journey (3)

As the groups presented their work, we collected new ideas for addition to the voter journey.

Journey steps: marking, printing and returning the ballot

- Should the system provide all materials needed, including envelopes to print? Or can voters use other materials (including VBM envelopes mailed to them)?
- How can the order of printing be managed to help protect the secret ballot even if assistance is needed? Could be: voter declaration page, cover page for ballot, ballot, envelope blanks.
- Can the ballot show only voter selections to make it more compact, and easier to verify with an OCR reader for those with print disabilities?

Questions for election integrity

- How can the secret ballot be protected, so that no one can intercept or alter a marked ballot? Can systems be designed so that once the ballot is received, it is used entirely offline – that is, no packets transmitted during marking and printing?
- How can voters who wish to do so check that any QR or barcodes accurately match their intent?

Final thoughts

Some of the final thoughts were instructive and helpful as reminders of how complex and detailed a problem this is.

- Any new voting system relies on trust. The system has to have both the perception of trust and real integrity.
- There are a lot of variations in local election laws that make detailed conversations hard.
- Designing a new voting system has an incredible amount of detail that must all be gotten right.
- Election codes may not mesh well with technical features.
- A human-readable summary can be read without interpreting bubbles.
- Signature authentication is an increasingly low bar, but we don't have anything better right now.
- Election officials have to be able to count the ballots quickly and accurately.
- Voters with visual impairments may still have to trust that the ballot printed well.
- All impairments influence design.
- Voters might not be comfortable providing personal details to access their ballot and would rather do it at the end.
- Voters might need more feedback through the process, but it's a fine line not to give too much information.

Background Material: The Voter Journey

We used the voter journey map from the NIST

Roadmap for usability and accessibility of elections

In the Roadmap, the concept of the roadmap was used to keep the work focused on the voter perspective—or voter journey. This journey describes the steps to take part in an election, from learning about an election to hearing the results. This made it easier to focus on the voters' experience, rather than limiting the scope to the systems.

For this project, we adjusted the steps in the journey to match critical issues in using a remote ballot marking system

The journey map used to kick off the workshop is available as an Excel file:
http://civicdesign.org/projects/remote-ballot-marking/

Background Material: Terminology

There are many related terms relevant to remote ballot marking. We suggested terms and working definitions for:

- **People:** voters, election officials, vendors, adversaries and the public
- **Secret ballot:** Secrecy, anonymity, privacy, Independence
- **Eligibility:** Identity or identification, authentication, authorization
- **Legal actions:** Integrity, fraud, coercion
- **Adversarial tactics:** Client side malware, denial of service, server hacking
- **Barriers to access:** Perception, operation, mobility, cognitive, digital access, assistive technology
- **Election terminology:** Vote by mail, ballot question, contest, poll worker, polling place, poll book, ballot style, remote voting

The terminology file is available as an Excel file:
http://civicdesign.org/projects/remote-ballot-marking/

Background Material: Reading list

We created a short list with recent and relevant papers and reports. It is not a comprehensive bibliography, but a list of some relevant research to consider.

The areas covered in the reading list of nine papers are:

- Security risk and analysis
- Accessibility, usability, and trust
- Reports on accessibility of other online election systems
- Reports in internet voting

The reading list is available on the project site:
http://civicdesign.org/projects/remote-ballot-marking/

Next steps

- **December 2015 or early January 2016**
  Publish preliminary report with proposed principles and guidelines for review and additional input.

- **February – March 2016**
  Update based on comments and publish final report