Usability of Electronic Poll Books

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IACREOT
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Introductions

Who is here today?
Background

About the project
Goals for the project

Understand current e-pollbooks
- Capabilities and use in elections
- How they affect the polling place

Look specifically at usability
- How poll workers use them
- How they help poll workers serve voters
- Training required
Survey of current e-pollbooks

- Fact finding interviews election officials in 22 states or counties
  - Who use e-pollbooks
  - Or were considering them
- Demos and reviews of 13 systems
  - 11 commercial e-pollbooks
  - 2 e-pollbooks built by election officials
Election Offices

- Colorado
- Connecticut
- District of Columbia
- Georgia
- Indiana and VSTOP
- Maryland
- Michigan
- Minnesota
- New Jersey
- Ohio
- Wisconsin
- Virginia
- Wyoming
- Austin, Texas
- Cook County, Illinois
- Fulton, Pennsylvania
- Minneapolis MN
- Nevada County, CA
- St. Louis County, MO
E-Pollbooks

- Robis Elections – Ask ED Pollbook
- VR Systems – EVid
- ES&S – ExpressPoll
- Votec – VoteSafe
- Scytl/SOE – Clarity ePollBook
- EA – EA Tablet

- EasyVote – EasyPollbook
- DemTech – Plexus
- KnowINK – PollPad
- Tenex – Pollbook
- EveryoneCounts – eLect
- Michigan
- Utah
We heard about: constraints, benefits, and drawbacks

- Legal constraints on use
- Benefits
- Drawbacks
## E-pollbooks in elections code

<table>
<thead>
<tr>
<th>Status</th>
<th>Language in the election code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prohibited</td>
<td>Language explicitly prohibits the use of electronic poll books, or includes language that effectively disallows them.</td>
</tr>
<tr>
<td>Neutral</td>
<td>There is no language or procedures in the code that cannot be done with an electronic poll book.</td>
</tr>
<tr>
<td>Allowed</td>
<td>Explicit language allowing EPBs or specifying procedures for their use.</td>
</tr>
</tbody>
</table>
## State certification or approval

<table>
<thead>
<tr>
<th>Requirements</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>No requirements</td>
<td>No requirements in the state election code. Counties may choose to use electronic poll books or not.</td>
</tr>
<tr>
<td>Data compatibility</td>
<td>Requires only compatibility with the state voter registration format.</td>
</tr>
<tr>
<td>Certification</td>
<td>EPBs must be approved through a state certification process. Examples:</td>
</tr>
<tr>
<td></td>
<td>• Indiana has a full certification process conducted by the state with an advisory program (VSTOP) at Ball State University</td>
</tr>
<tr>
<td></td>
<td>• Ohio has an approval process conducted by a state board</td>
</tr>
<tr>
<td>Approval</td>
<td>The state approves vendors and products from which counties may select, or approves products on a case-by-case basis, but without a formal certification process.</td>
</tr>
</tbody>
</table>
State may require specific e-pollbooks

<table>
<thead>
<tr>
<th>Requirements</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single system</td>
<td>The entire state uses a single product. Local elections offices are either required to use it, or must use it if they use an EPB</td>
</tr>
<tr>
<td></td>
<td>• Michigan and Utah have a system managed by the state Department of Elections</td>
</tr>
<tr>
<td></td>
<td>• Colorado’s Uniform Voting System will include an electronic poll book</td>
</tr>
<tr>
<td>EPB as part of a voting system</td>
<td>The EPB is a component in a state-wide voting system.</td>
</tr>
<tr>
<td></td>
<td>• Some voting systems create a voter access card (or similar technology) that activates the voting session, and which updates an electronic voter list.</td>
</tr>
<tr>
<td></td>
<td>• Maryland and Georgia have a single voting system for the entire state which includes an electronic poll book</td>
</tr>
</tbody>
</table>
Benefits

- Accuracy at the polling place
- Faster voter check-in
- Connected e-pollbooks enable vote centers

Drawbacks

- New technology in election administration
- Challenges to poll worker acceptance of new technology in the polling place
- Cost
What do e-pollbooks do?

Summary of the landscape analysis
What is an e-pollbook (physically)?

<table>
<thead>
<tr>
<th>Hardware</th>
<th>Variations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Device</td>
<td>Laptop (usually Windows)</td>
</tr>
<tr>
<td></td>
<td>Tablet (Windows, Android, iPad, iPad mini)</td>
</tr>
<tr>
<td>Operating system</td>
<td>Windows, Windows 7, Windows 8</td>
</tr>
<tr>
<td></td>
<td>Android, iOS (Apple)</td>
</tr>
<tr>
<td>Scanner for ID</td>
<td>External, or tablet camera</td>
</tr>
<tr>
<td>Signature capture</td>
<td>External device, or tablet screen</td>
</tr>
<tr>
<td>Case or stand</td>
<td>Wide variety of custom cases and stands</td>
</tr>
<tr>
<td>Printer</td>
<td>Small label printer (often Brother), may be bluetooth</td>
</tr>
<tr>
<td>Other</td>
<td>Link to printer for ballot-on-demand</td>
</tr>
<tr>
<td>Mobile apps</td>
<td>Mobile app for line management</td>
</tr>
</tbody>
</table>
What does an e-pollbook do?

- The most basic function: Check in a voter
  - Find a voter in the database
  - Review the voter record to confirm their identity
  - Collect the voter’s signature or other identification
  - Issue the ballot or any authorization materials
  - Mark the voter as having voted
What does an e-pollbook do?

- They also
  - Identify the correct polling place for a misplaced voter
  - Collect updates and new registrations electronically
  - Synchronize with other poll books or the VR database
  - Facilitate communication between office and polling place
  - Provide instruction and scripts for poll workers
  - Facilitate updating voter history
  - Allow a central office to monitor polling place activity
  - and....


## Connectivity

<table>
<thead>
<tr>
<th>Scope</th>
<th>Impact of ED admin</th>
</tr>
</thead>
<tbody>
<tr>
<td>EPBs synced with central</td>
<td>Immediate ED updates (e.g., mail-in ballots, voter registration) between polling places and central</td>
</tr>
<tr>
<td>Periodic voter record updates (central =&gt; EPBs)</td>
<td>Central updates (e.g., mail-in ballots, voter registration) sent to polling places</td>
</tr>
<tr>
<td></td>
<td>Intermediate updates handled manually</td>
</tr>
<tr>
<td>Periodic voter record updates (EPBs =&gt; central)</td>
<td>EPB updates (e.g., voter history, voter registration) sent to central</td>
</tr>
<tr>
<td>None</td>
<td>Updates handled manually</td>
</tr>
</tbody>
</table>
# E-Pollbook election journey

<table>
<thead>
<tr>
<th>Pre-Election</th>
<th>Election Day</th>
<th>Post-Election</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prepare voter registration lists</td>
<td>Setup</td>
<td>Closing</td>
</tr>
<tr>
<td>• Pull voter records</td>
<td>• Set up system</td>
<td>• Shut down system</td>
</tr>
<tr>
<td>• (Transform format)</td>
<td>• Connections</td>
<td>• Final reports or reconciliation</td>
</tr>
<tr>
<td>• Load e-pollbooks</td>
<td>• Supplemental updates</td>
<td></td>
</tr>
<tr>
<td>• Set up access for poll workers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Training/Support</td>
<td>Live Communication</td>
<td>Election Reporting</td>
</tr>
<tr>
<td>• Scripts/prompts in e-pollbook</td>
<td>• Data updates</td>
<td>• Election checks &amp; audits</td>
</tr>
<tr>
<td></td>
<td>• Status of polling place</td>
<td>• Turnout analysis</td>
</tr>
<tr>
<td></td>
<td>• Messages to and from the polling place</td>
<td>• Voter history</td>
</tr>
<tr>
<td></td>
<td>• Support questions</td>
<td></td>
</tr>
<tr>
<td></td>
<td>At the Polling Place</td>
<td>Return</td>
</tr>
<tr>
<td></td>
<td>• Voters in wrong location</td>
<td>• Collect final records from EPB</td>
</tr>
<tr>
<td></td>
<td>• Already voted</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Provisional ballots</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Election day registrations</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Voter information updates</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Reports and Status</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Turnout and lines</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Mid-day voter lists</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Polls Open</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Check in voters</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Variations in connectivity

Less connectivity

- e-pollbook replaces printed rosters

Constant connectivity

- e-pollbooks connected within a polling place
- e-pollbooks connected within a county on election days
- polling place has direct connection to state database
E-pollbook Usability

What do we need to consider
Understanding usability for e-pollbooks

Usability is a measure of the effectiveness, efficiency, and satisfaction achieved by a specified set of users with a given product in the performance of specified tasks.

In this case:
- The product is the electronic poll book
- The users are the poll workers
- The tasks are the different scenarios and associated activities
Usability: Efficiency

The **efficiency** with which poll workers can complete both routine and unusual tasks.

- Can e-pollbooks speed up voter check-in and reduce lines at the polling place?
- Is the design optimized for the most frequent tasks?
- Does the design help poll workers identify voters and special circumstances quickly?
- Can updates be completed in a reasonable amount of time?
Usability: Effectiveness

Effectiveness is the measured by the accuracy with which poll workers can handle each voter. For example, can they:

- Find and identify the correct voter registration record
- Recognize any special conditions, such as whether they have already voted or identification requirement
- Take appropriate action to check the voter in or deal with any special requirements
- Complete any administrative procedures such as logging unusual events or updating records
Usability: Satisfaction

Satisfaction is a measure of poll workers’ attitude towards electronic poll books. This includes both positive attitudes and by a lack of negative attitudes about them.

Do poll workers believe that electronic poll books:

- Help them do their job well
- Make finding voters easy
- Let them check voters in quickly
- Help them interact with voters in a helpful way
Usability is in the details

- Presentation
  - Visual hierarchy – what stands out on the screen
  - Information display – data grid or human-readable
  - Clarity or clutter

- Navigation
  - Efficiency - Steps or screens to complete a common task
  - Learnability - Access to less common tasks

- Work process support
  - Labels – does terminology match procedures
  - Reminders – does the interface help support tasks
Example
Finding a voter

- How easy is it to enter a search?
- How many screens does it take from home to voter record?
**Example**

**Voter lists**

- How easily can a poll worker find a voter in the list?

<table>
<thead>
<tr>
<th>Voter ID</th>
<th>Last Name</th>
<th>First Name</th>
<th>MI</th>
<th>Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>95852348611</td>
<td>Doughtery</td>
<td>Jordan</td>
<td></td>
<td>23 Chestnut, Maple</td>
</tr>
<tr>
<td>76654123123</td>
<td>Driver</td>
<td>John</td>
<td>L</td>
<td>1545 Tates Drive, Br</td>
</tr>
<tr>
<td>54788232367</td>
<td>Driver</td>
<td>Melinda</td>
<td>K</td>
<td>1545 Tates Drive, Br</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Name</th>
<th>Address</th>
<th>Voter ID</th>
</tr>
</thead>
<tbody>
<tr>
<td>Doughtery, Jordan</td>
<td>23 Chestnut, Maple</td>
<td>95852348611</td>
</tr>
<tr>
<td>Driver, John L</td>
<td>1545 Tates Drive, Berwyn</td>
<td>76654123123</td>
</tr>
<tr>
<td>Driver, Melinda K</td>
<td>1545 Tates Drive, Berwyn</td>
<td>54788232367</td>
</tr>
</tbody>
</table>
Example

Voter status

- Can pollworkers easily see the status of each voter?
- Are the indicators easy to understand?

<table>
<thead>
<tr>
<th>Status</th>
<th>Name</th>
<th>Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>ID Req'd</td>
<td>Doughtery, Jordan</td>
<td>23 Chestnut, Maple Grove</td>
</tr>
<tr>
<td>Voted</td>
<td>Driver, John L</td>
<td>1545 Tates Drive, Berwyn</td>
</tr>
<tr>
<td></td>
<td>Driver, Melinda K</td>
<td>1545 Tates Drive, Berwyn</td>
</tr>
<tr>
<td>Voted</td>
<td>Driver, Samantha</td>
<td>1545 Tates Drive, Berwyn</td>
</tr>
</tbody>
</table>
Example
Voter details

- Does the layout make the name easy to see

<table>
<thead>
<tr>
<th>Voter ID</th>
<th>000000000001</th>
</tr>
</thead>
<tbody>
<tr>
<td>Last Name</td>
<td>Doughtery</td>
</tr>
<tr>
<td>First Name</td>
<td>Jordan</td>
</tr>
<tr>
<td>Middle Name</td>
<td></td>
</tr>
<tr>
<td>Sex</td>
<td>M</td>
</tr>
<tr>
<td>DOB</td>
<td>08/01/1963</td>
</tr>
<tr>
<td>Address</td>
<td>123 Chestnut</td>
</tr>
<tr>
<td>City</td>
<td>Maple Grove</td>
</tr>
<tr>
<td>Zip</td>
<td>08888</td>
</tr>
</tbody>
</table>

**Jordan Doughtery**
August 1, 1963 - Male
23 Chestnut, Maple Grove
Usability testing
A method for testing usability

Possible uses for a usability testing method:

- **Formal test protocol**
  - Benchmarking or comparing systems
  - Certification

- **Informal uses of usability testing**
  - Purchase decisions
  - Planning poll worker training
Concept: Watch and learn

- Simulate field conditions
- Observe poll workers actually using an e-pollbook to check-in voters
  - What’s easy, intuitive?
  - What’s difficult, confusing?
  - What’s the overall experience like?
A simple test setup

Note-taker  Poll worker  3 (or more) “voters” with scenarios simulate the line, rotating through the line as often as needed
The basic session repeats

Repeat with 6-10 participants (acting as poll workers)
Comparing two or more e-pollbooks?

Repeat entire process for each e-pollbook being tested
Scenarios

- Voter is registered, in correct polling place with ID variations
- Similar/same names
- Registered but in wrong place
- Already voted
- Not in database at all
- Updates
Include set up and shut down?

The usability test can include

- Setting up at the beginning of election day
  - Unpack and set up communications
  - Morning supplemental updates
- Shut down at the end of election day
  - Reports and other updates
  - Shut down and pack up
Analyzing the data

- What scenarios did all poll workers complete successfully?
- What scenarios did most or all poll workers have problems with?
- How consistent are the types of problems participants had?
- How similar are the number of different problems each participant had?
- Are there differences in success scores for experienced/inexperienced/first-time participant poll workers?
Comparing e-pollbooks

- What differences do you see in the completion scores for common/uncommon scenarios between the epoll-books?
- What differences do you see in the completion scores for experienced/inexperienced/first-time participant poll workers between the e-pollbooks?
- If your poll workers participated twice, once on each e-pollbook, what is their subjective reaction to the e-pollbooks? Do they have a preference and why?
Can problems be minimized or fixed?

- Could changes in training help poll workers be more successful?
- Are there customizable prompts or instructions on the screen that can be improved?
- Is the problem in the interface design or interaction?
Workshop / Discussion

What matters in e-pollbook usability
What usability issues matter to election administration?

Think about these questions:

- What issues do you anticipate (or have you experienced) around the check-in process?
- What usability-related benefits do you hope for around the check-in process?

Write your answers on individual pieces of paper and put them out on the table.
Share back from the groups

Let's hear from everyone about the usability problems they identified.

Discussion:

- Any issues raised at other tables that your group didn't think of?
Discussion

- Is the idea of a usability test for e-pollbooks useful?

- How might it be used?
  - For purchase decisions?
  - For certification?
  - To understand training needs?
  - As a way for staff to walk through the features of a system?
Usability test scenarios
How do we test for usability

Scenarios – or tasks – let participants use the pollbooks, while ensuring that we cover as many different situations (and usability issues) as possible.

A scenario includes
- The potential usability issue being tested
- The voter situation
- What success or failure might be
- Any pollbook setup needed
<table>
<thead>
<tr>
<th>Nickname</th>
<th>Scenario</th>
<th>e-pollbook setup</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Regular voter</td>
<td>You are: Jordan Dougherty &lt;street address&gt; &lt;city&gt; &lt;state&gt; &lt;zip&gt;</td>
<td>This voter, at that address, is a registered voter for this polling place, and has not voted.</td>
</tr>
<tr>
<td>Has drivers license</td>
<td>You have your driver’s license with you</td>
<td>Materials: “drivers license” with scan code.</td>
</tr>
<tr>
<td>3. Regular voter</td>
<td>You are: Andrea Manciano &lt;street address&gt; &lt;city&gt; &lt;state&gt; &lt;zip&gt;</td>
<td>This voter, at that address, is a registered voter for this polling place</td>
</tr>
<tr>
<td>Has a voter card</td>
<td>You don’t have your DL with you. You have your XXX</td>
<td>Materials: “voter card” (no photo or scan code)</td>
</tr>
</tbody>
</table>
## Sample scenarios

**Similar / same names, hard to spell names**

<table>
<thead>
<tr>
<th>Nickname</th>
<th>Scenario</th>
<th>e-pollbook setup</th>
</tr>
</thead>
</table>
| 5. Multiple duplicate last names             | You are: Kim Miller  
<street address> <city>  
<state>  <zip>                                                                 | Voter is registered for this polling place  
The e-pollbook contains 5-10 voter records with the same last name in this polling place. One of the other voter records is Kam Miller.  
Materials: Do not use scanned ID |
| 8. Same name, same address with Jr/Sr        | You are: Sidney Davenport Jr.  
<street address> <city>  
<state>  <zip>  
Add’l information: Your father (Sr.) lives at the same address and has the same name. | Sydney Davenport Jr (DOB 1990) is registered to vote in this polling place. Sydney Davenport Sr (DOB 1960) is registered to vote in this polling place. Both Davenport’s have the same address.  
Materials: Do not use scanned ID |
## Sample scenarios

**Voter flagged**

<table>
<thead>
<tr>
<th>Nickname</th>
<th>Scenario</th>
<th>e-pollbook setup</th>
</tr>
</thead>
<tbody>
<tr>
<td>11. ID required</td>
<td>You are: &lt;first&gt; &lt;last&gt; &lt;street address&gt; &lt;city&gt; &lt;state&gt; &lt;zip&gt;</td>
<td>Voter is registered for this polling place. Voter is flagged as being required to show ID. Materials: Any photo ID</td>
</tr>
<tr>
<td>15. Voter marked as needing assistance</td>
<td>You are: &lt;first&gt; &lt;last&gt; &lt;street address&gt; &lt;city&gt; &lt;state&gt; &lt;zip&gt; Add’l information: You can’t stand for long periods of time; you need to be able to sit while casting your vote.</td>
<td>Voter is registered for this polling place. Voter is flagged as needing assistance</td>
</tr>
</tbody>
</table>
## Sample scenarios

### In wrong place

<table>
<thead>
<tr>
<th>Nickname</th>
<th>Scenario</th>
<th>e-pollbook setup</th>
</tr>
</thead>
<tbody>
<tr>
<td>16. Wrong table/precinct at polling place</td>
<td>You are: &lt;first&gt; &lt;last&gt; &lt;street address&gt; &lt;city&gt; &lt;state&gt; &lt;zip&gt; Voter is registered for this polling place but not for this precinct</td>
<td>Supporting materials</td>
</tr>
<tr>
<td>17. Wrong polling place</td>
<td>&lt;first&gt; &lt;last&gt; &lt;street address&gt; &lt;city&gt; &lt;state&gt; &lt;zip&gt; Voter is registered but not in this polling place</td>
<td>Voter is registered but not in this polling place</td>
</tr>
</tbody>
</table>
## Sample scenarios
### Already voted

<table>
<thead>
<tr>
<th>Nickname</th>
<th>Scenario</th>
<th>e-pollbook setup</th>
</tr>
</thead>
<tbody>
<tr>
<td>18. Voted earlier today</td>
<td>You are: &lt;first&gt; &lt;last&gt; &lt;street address&gt; &lt;city&gt; &lt;state&gt; &lt;zip&gt;</td>
<td>One of the “voters” cycles through the line a second time to trigger this scenarios</td>
</tr>
<tr>
<td>19. Already voted by early/mail</td>
<td>You are: &lt;first&gt; &lt;last&gt; &lt;street address&gt; &lt;city&gt; &lt;state&gt; &lt;zip&gt;</td>
<td>Voter marked as having already voted in this election.</td>
</tr>
</tbody>
</table>
# Sample scenarios

Not in database at all

<table>
<thead>
<tr>
<th>Nickname</th>
<th>Scenario</th>
<th>e-pollbook setup</th>
</tr>
</thead>
<tbody>
<tr>
<td>20. Registered to vote by mail at the last minute</td>
<td>You are: &lt;first&gt; &lt;last&gt; &lt;street address&gt; &lt;city&gt; &lt;state&gt; &lt;zip&gt; You never voted before. You mailed in your voter registration info 3 days ago.</td>
<td>Voter not in the database. Address provided by voter is within the precinct/township.</td>
</tr>
<tr>
<td>21. Claims to be registered, address is outside of precinct/township</td>
<td>You are: &lt;first&gt; &lt;last&gt; &lt;street address&gt; &lt;city&gt; &lt;state&gt; &lt;zip&gt; You are sure you voted last year at this location.</td>
<td>Voter doesn’t show up in the database. Address provided by voter is within the precinct/township.</td>
</tr>
</tbody>
</table>
### Sample scenarios

#### Updates

<table>
<thead>
<tr>
<th>Nickname</th>
<th>Scenario</th>
<th>e-pollbook setup</th>
<th>Supporting materials</th>
</tr>
</thead>
</table>
| 23. Update name              | You are: Rayan Rivero  
You legally changed your name to “Paz” last month and want to get it updated here too.                                                                                                              | Voter is registered for this polling place                                           |                                                                                                                                                       |
| 25. Register new voter       | You are: Micah Hamilton  
<street address> <city> <state> <zip>  
You moved from another state recently. You have the proper ID showing your address is within the precinct                                                                                   | Voter is not in database. Voter meetsthe requirements showing residency and vote eligibility for coting in this precinct.                  |                                                                                                                                                       |
Wrapup
Next steps

- Complete our report

- Pilot test of the test by Center for Civic Design this summer

- Publish the test protocol and report on how it worked
Thank you.
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