

Election Verification: New Frontiers

Election Verification Network Conference
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Introduction

Panel Participants:

- Neal McBurnett, Election integrity consultant
- Vanessa Teague, Democracy Developers, Ltd.
- Brad Sturt, University of Illinois Chicago
- Dwight Shellman, CO Dept. of State

Agenda

Exploring new frontiers for achieving Evidence-Based Elections

- Auditing Eligibility, Signature Verification
- Auditing Chain of Custody
- Auditing Proportional Representation
- Robust Logic & Accuracy Testing
- Improving Transparency
- Improving Communication with the Public

Neal McBurnett

- Consultant
- Software developer
- Working on election audits and integrity since 2003
- Poll worker
- Pioneered RLAs in Colorado with my own code in 2010, Boulder County
- On teams that wrote the software for Colorado's current state-wide audit
- Volunteer Voting Board member
- Colorado Bipartisan Election Advisory Commission
- Speaking for myself

Goal: Evidence-Based Elections

- Beyond tabulation auditing, which assumes that other aspects have been audited...
 - Note panel last year [RLA Experiences and Future Steps](#)
 - Note [Colorado's Risk-Limiting Tabulation Audits: Accomplishments and Proposed Improvements](#)
- Intense interest in verifying other aspects of elections
 - Voter Registration
 - Evidence of voter eligibility
 - Chain of Custody protection
- Computer systems are vulnerable, simply put
- "Assume breach"! as CISA and the DoD put it
- Insider attacks - occasional fraud
- Only robust auditing can protect us from many threats

Improving Transparency and Understanding

- Better communication and transparency are crucial for public confidence
 - Explain how audit will work before it starts
 - Publish data to be audited before the roll of the dice
 - Verified Voting is engaging with voters on their understanding, expectations
 - Dwight will expand on the goals and challenges

Auditing Signature Verification

- Challenging: no clear "ground truth"
- Young people particularly prone to mismatches
- Colorado doing pilots, evolving since 2022
- CO Law doesn't allow audit to change original decision
- US Digital Response provided software support
- Can check for judges with unusually high or low match rates
- When sorting machines are used, need to audit them also
 - Human decision vs actual path of envelope and ballot
 - Note sorting machines often are connected to the Internet
- Note also **Utah's Signature Verification Audits**
- Others?

Auditing Chain of Custody

- Joint work via Colorado County Clerks Association: Carly Koppes, Jimmy Flanagan etc.
- Goal: detect changes to the paper ballots between scan time and audit time
- Publish hashes of ballot images the day after they have been scanned
 - A "commitment" that pins the image down without revealing anything about the contents
 - Add a digital signature for authenticity, additional provenance
- At audit time, check the image against the paper, and the image against the hash
- Related to work by Microsoft and others to establish provenance of candidate videos, ads, web sites

Ballot Image Pipeline Challenges

- Dominion ballot image data changes over time
 - Original image files are in TIF format, multi-page, includes AuditMark: CVR and adjudication
 - So image file and hash changes with each adjudication
 - Sometimes produces .SHA files for each .TIF, not clear when
 - Dominion's Ballot Audit Tool (BAT) provides images in PNG format, with recent timestamp in metadata
 - So we can't compute a hash up-front which would match what BAT would produce

Auditing Proportional Representation

- Multi-winner districts, with winners chosen to mirror electorate
- Proportional Representation (PR) can eliminate possibility of gerrymandering
- Used in most democracies around the world
- Supported by growing list of organizations, including League of Women Voters
- Many methods achieve PR
 - Single-Transferrable Vote (multi-winner ranked voting)
 - **Proportional Approval Voting**
 - STAR-PR
- Challenges: variety of winning combinations => margins likely to be very tight
- General question: how should we audit the various PR methods?

Proportional Approval Voting audits

- Approval voting ballot: simply vote for all the candidates you approve of
- Looks at all possible sets of winners and finds the one with the highest measure of voter satisfaction
- RLA math is easy, but margins often tight
- Alternative: statistically guarantee a given level of satisfaction, rather than an exact set of winners
- Much simpler to at least demonstrate that the result is better than plurality at-large!
- **Proportional STAR Voting** (Allocated Score)
 - How to audit is an open problem

Link to this presentation:

<https://bcn.boulder.co.us/~neal/elections/evn-frontiers/evn-frontiers.pdf>

