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TITLE Auditing the Election Ecosystem

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Introduction

Election administration is a highly complex process that involves multiple actors all working to achieve the goal of running an effective election.[i] Accomplishing this goal requires election officials coordinating the efforts of contractors—from ballot printers to voting machine companies—third parties, like the US Postal Service who transport absentee ballots and the entities who agree to house polling places, and the poll workers who actually implement the election at the polls. Managing this vast enterprise requires election officials to evaluate their election activities so that they can improve the implementation of the process over time.

One critical technique for gathering the performance data needed to improve election management is through comprehensive evaluations, which we refer to as election ecosystem audits (EEA). These audits are evaluations of an election from start to finish.[ii] This type of evaluation uses both existing data that are collected as a matter of course in the election process as well as new data that are specifically generated for this purpose. Post election voting machine performance audits are an example of this latter type.[iii]

Currently these data are generated over the course of an election, but are not examined for evaluative purposes. These data should feed into the election management process, so that the election officials can use the data to improve the process for the next election. Training, procedures, and processes can be modified to address shortfalls that were identified during the EEA. Thus, the point of EEA is to provide a feedback mechanism to improve the performance of the local election administration.

The steps below are designed to show how an ecosystem audit works. These audits do require planning, but also provide quite effective data for improving election management. The analysis of this audit process comes from a review of election audits in New Mexico and Utah. Below is a step-by-step process for conducting a complete audit, with a special focus on post-election machine performance audits. Some type of post election machine performance audits have been implemented in 18 states to verify voting systems and it is becoming a more common practice to ensure election integrity and instill voter confidence.[iv] However, some states have requirements for audits that are triggered only when certain events occur and some states have election audit requirements that are only required for electronic voting but not for optical scan or other paper ballots.

In most states, these audits are relatively limited in scope and election officials are typically the individuals who are required to conduct the audits of their own actions. Only in Washington State does a third-party, the county auditor, conduct the audit. Interestingly, half of the states that implement audits do not require audit results to be formally reported. Even in states with reporting requirements, the state may not issue a formal report that details all of the audit results and any problems that were identified. Therefore, we make recommendations on procedural practices for conducting post election audits.

Step 1: Mapping the Election Process

The first key step for conducting an EEA is to map out each aspect of the election process. This requires thinking about each step in the process of running the election; it is quite helpful to flow chart these activities. It is also important to identify the forms and reports that are produced through the election process that can be used to document the completion of each

task. The flow charting process will identify all key players in the election process, the various steps in the registration and voting process, and identify potential breaks in the chain of custody process that will make auditing the election more difficult.

Step 2: Auditing Each Process

Elections have an array of processes that occur before the election that should be observed and examined to ensure that the process is done correctly. For example:

1. All states have some law or regulation related to logic and accuracy testing. This is the first process that can be mapped; how does the LEO test these machines and what documentation is produced at the end of this process? For example, a LEO might produce a signed checklist at the end of the process showing how an electronic tabulator (for optical scan or DRE voting) was physically examined and tested for its tabulation accuracy. The logic and accuracy test needs to cover the tabulation technology used for early voting, absentee voting, and in-person precinct voting.
2. The training of election workers is also critical, given the key role that they play as street level bureaucrats implementing election policy. An audit of any type generally has a strong focus on training and personnel and how people are taught to implement processes. Examining training documents, the manuals poll workers have to reference at the polls on Election Day, and the issues emphasized in training are all things that can be examined in an EEA. Simple surveys can be used to evaluate the experience of poll workers on Election Day and in early voting and evaluate the effectiveness of the training and materials provided to poll workers. Surveying poll judges or head poll workers in every precinct, all poll workers in a smaller random sample of precincts, or

simply a simple random sample of all poll workers can provide this information. Election observers may also play a key role in identifying poll worker problems.[v]

It is also important to audit each voting mode—absentee, early, and Election Day voting—carefully. These audits focus on ballot reconciliation, chain of custody issues, and procedures.

1. For absentee voting, audits are critical because election officials lose physical custody of the ballot while it is in transit. An audit should allow for the accounting of where and when ballots were sent to the voter, when ballots were returned to the LEO, and how the ballots were handled and secured at the LEO site before and after counting. For absentee voting, an EEA might include auditing the physical location where the ballots are stored for security, accounting to ensure that the number of ballot printed minus the number of ballots sent out equal the number of un-sent ballots, the procedures for challenging and rejecting absentee ballots, and whether the number of absentee votes in the election is similar to previous patterns of absentee voting.
2. For early voting, the key issue is being able to account for the security and custody of ballots over the entire early voting period and reconciling this with the number of individuals who cast ballots. An EEA of the early voting process might include examining, if the total number of voters who signed the voter registry on a given day equal the number of voters who cast ballots on that same day, if the total number of votes cast and the total number of voters in one day provide the starting number for the number of votes cast and the number of voters who have voted in the next day, and a review of any logs that are kept showing how the chain of custody of the voting system was maintained each day.

3. Provisional balloting is a key fail-safe mechanism in the electoral process. An EEA of this process might examine how many provisional ballots were cast, if any precincts have more provisional ballots than would be expected based upon data from other precincts or past history, the process and procedures for determining whether a provisional ballot is qualified or not, and the number of ballots that were counted and rejected, and the primary reasons for rejection.

Finally, the most important yet generally overlooked issue in thinking about elections from an EEA standpoint is voter registration. Voter registration files are a cornerstone of the voting process; if you are not correctly registered, you typically cannot vote. These files must have integrity and, therefore, should be audited for accuracy.

1. A basic issue for such an audit is whether it should be a 100% audit of the file or an audit of a sample of the file. A 100% audit examines the file completely, but at the cost of being time consuming and human resource intensive. An alternative is to conduct an audit of a sample of the voter registration file.[vi]
2. Data on provisional voting can be used to help audit the voter registration files. This is especially true if a problem with the file is the cause of a provisional vote.
3. Incident reports may also be used to identify voter registration problems.
4. Survey data—of voters and poll workers—may provide additional data about the voter's experience with voter registration and problems at the polls on Election Day.

Step 3: Election Day Voting

Election Day is when most Americans still cast ballots. Because of this, it should be a central focus of any EEA. The focus of this part of the EEA should be on combining multiple metrics of

evaluation—surveys of voters, surveys of poll workers, and independent election observations of precinct voters—to determine how well the election was run. Such evaluations are critical for knowing if any problems occurred on Election Day and how systematic such problems were. This is also an opportunity to determine how well the LEO implements its chain-of-custody guidelines that track ballots and voters over the course of the election.

The EAA audit of the in-person Election Day voting process can use logs of security tags and seals, incident reports, rovers from the central office, and information from third party election observers to identify problems at the polling place. These problems may include issues related to opening or closing the polls, lack of supplies, reconciliation of ballots (the total ballots cast at the end of the day equals the number of voters who signed in to vote), issues related to the polling place, voter privacy issues, a lack of consistency in procedures across precincts (e.g. handling of voter id or handling of provisional voters). Other problems may need to be determined by a closer look at voter experiences through random surveys or through convenience surveys in polling places.

Step 5: EEA and Special Populations

Jurisdictions with sizable special populations—such as language minorities or overseas and military voters—should take special care to audit the process that these voters use to vote. For example, in jurisdictions who are covered by the language minority provisions of the Voting Rights Act, an audit would likely include examining the translated materials used to assist language minority voters and evaluating the quality of the interpreter services provided to the voters. Likewise, it might be important to interview language minority voters using an exit poll

or interest groups that work with these voters to ensure that voters were not pressured or given improper assistance by these interpreters.

In the case of overseas or military voters, examining the ballots that were or were not included in the final tally of votes and the reasons why votes were or were not rejected would be important. An audit conducted after the 2000 election in Florida identified a myriad of issues associated with the determination of whether to include or exclude this category of ballots in the final canvass.[vii]

Step 6: A Post-Election Machine Performance Audit

The post-election machine performance audit provides a final check on the chain of custody procedures and ensures that the initial count on Election Day was not flawed for some reason (e.g. fraud, poor logic and accuracy testing). Audits can be hot, completed before certification of the voting results, or can be cold, completed after certification of the election. Hot audits are preferred by activists because they are completed before the results are certified. Theoretically a hot audit allows a fraudulent election to be over turned.

Below we consider how to conduct a post-election machine performance audit for optical scan ballots and for ballots cast on a direct recording electronic (DRE) voting machine.

1. Organizing the Ballots: Because some jurisdictions process large numbers of absentee ballots on one machine, absentee ballots that are included in a post-election audit may need to be organized into smaller batch units in preparation for an audit that includes all voting modes (e.g. Election Day, absentee and early). With a DRE voting with a paper trail, the paper tapes will need to be organized onto a spool or other mechanism that allows the paper tape to be reviewed easily.

2. Transparency: Transparency and openness are critical for any post-election audit process. To the extent possible, all steps and aspects of any post-election audit process must be open to public input and observation, and the results of all post-election audits should be made easily available to the interested public.

3. Audit Team Selection: - A competent, independent, and effective audit team is required to perform the audit efficiently and accurately. Independence of the team members, especially the audit manager, is necessary to ensure that the auditor is free from conflicts of interest and external threats to independence. Counting and administrative team members need to have good counting and focus skills.

4. Sampling Of Voting Systems For Audit: The process of sampling of voting systems should be transparent, open to public participation and use stratified random sampling, stratified by the local jurisdictional unit. Thus, sampling should include all jurisdictional units and all voting modes.[viii] It is necessary to include all jurisdictions because jurisdictional units are largely responsible for the logic and accuracy testing of their machines and so if there is a problem within a machine it is likely specific to a jurisdictional unit and may suggest larger problems for them. It is necessary to include all voting modes because each voting mode creates different potential security and voting problems for the LEO. County election officials should consider "over sampling" voting systems when they have reasons to believe that there might have been some sort of problem involving those voting systems. It is preferable that the sampling occurs very late on Election Day or post election. If precincts are selected prior to the election, any effort to subvert the system can avoid these precincts. If precincts are selected after

the election, there may be a bias toward selecting "good precincts," although completely public and transparent random sampling should limit these concerns.

5. Chain Of Custody Procedures: All counties should develop chain of custody procedures for their post-election audits and make them available to the public. Chain of custody procedures should emphasize security of the ballots and the election process. Ballots counted by hand need to be accounted for at every stage of the post election auditing process. Thus, counters must confirm at every stage that they are receiving or returning the correct number of ballots.

6. Audit Forms And Logs: Develop audit forms for the post election audit to facilitate a smooth audit process and provide quick results to the public upon completion. These include a log of the Election Day machine count as provided by the poll workers and judges for each counting machine and the hand-count audit forms for the post election audit. Also, it is important for the integrity of the process to develop a log and a procedure for hand counters to check out and return ballots during the audit period.

7. Voter Intent Standards: Election officials should develop precise voter intent standards based upon state law and these voter intent standards should be communicated to audit team members as part of their training.

8. Hand Counting Procedures: An audit supervisor should be placed in charge of the audit to coordinate and facilitate the hand count in a timely and efficient manner, monitor and train the counting team(s), summarize the findings and provide that information to the County Clerk, and maintain chain of custody rules over the course of the audit. Counting teams should not have any information about the totals from the machine

counts to prevent the appearance of coercion or influence of readers and counters in their count. Counting teams should have a minimum of two people –one counter and one reader.

9. Reporting: The results of the audit should be released as soon as possible after completing the audit on the County Clerk's website or other public place if a website is not available and be provided to the Secretary of State. The Secretary of State should combine the county files and place the entire state's results on the Secretary of State's website. Both files should be downloadable for public examination. The results should show the total number of ballots recorded by machine, the total number of votes cast for each candidate by machine, the parallel data from the hand count, and the percentage difference between the machine and hand count.

10. Handling Problems: Additional procedures should be developed for resolutions of problems found over the course of the audit so they can be resolved.

Step 7: Archiving of All Audit Material

All forms, counts and other data generated by all aspects of the audit, especially the post election machine performance audit, should be archived for future reference in case of litigation and to provide a history of the election process, which can be reviewed by the public, elected officials, or other interested parties. We recommend that these should be centralized for easy access, though election jurisdictions likely will also want to keep a copy for their internal record keeping as well. One possible location for these materials would be the state library. Libraries already maintain procedures for examining state documents and thus provide an obvious and accessible storage place for these valuable materials. State library storage also

relieves the burden of the Secretary of State's office, or other state office that oversees elections, from maintaining these materials and providing rules for their public access.

Conclusion

The point of an EEA is not merely to collect data about the performance of the system at various parts of the election process. Instead, the audit should result in a set of management recommendations that identify weaknesses in the system that should be addressed in the future, as well as a set of strengths to the system that should be maintained. This will allow the LEO to know how to improve the election process in that jurisdiction.

For example, if the EEA identifies a high number of provisional ballots being rejected because poll workers are failing to complete the outside of the provisional balloting envelope correctly, this would be a management recommendation to improve poll worker training and standard operating procedures for processing such ballots on Election Day. The EEA process should result in a stronger system in the future and an improved set of standard operating procedures that govern the election.

[i] Alvarez, R. M., & Hall, T. E. (2006). Controlling Democracy: The Principal-agent Problems In Election Administration. *Policy Studies Journal* , 34, 4: 491-510.

[ii] For example, see Atkeson, Lonna Rae, R. Michael Alvarez, Thad E. Hall. 2008. "The New Mexico 2006 Post Election Audit Report," typescript, University of New Mexico," available at: http://electionaudit.unm.edu/.

[iii] For example, see Halvorson, M. and L. Wolff (for Citizens for Election Integrity Minnesota). "Report and Analysis of the 2006 Post-Election Audit of Minnesota's Voting Systems." Retrieved October 14, 2008 from http://electionaudits.org/files/MN%20Audit%20Report%20by%20CEIMN.pdf . (2007); Smith, P. (for VerifiedVoting.org). "Written Testimony before Committee on House Administration, Subcommittee on Elections." U.S. House of Representatives. Retrieved October 14, 2008 from http://electionaudits.org/files/PamelaSmithTestimonyFinal_2007mar20.pdf . (2007); "Case Study: Auditing the Vote." Retrieved October 14, 2008 from http://electionline.org/Portals/1/Publications/EB17.pdf. (2007); Cohen, S. "Auditing Technology for Electronic Voting Machines." VTP Working Paper #46. Retrieved October 14, 2008 from http://www.votingtechnologyproject.org/wps-recent.html. (2005); Popoveniuc, S. and B. Hosp. "An Introduction to Punchscan." Retrieved October 14, 2008 from http://punchscan.org/papers/popoveniuc_hosp_punchscan_introduction.pdf. (2006).

[iv] www.verifiedvoting.org.

[v] Alvarez, R. Michael, Lonna Rae Atkeson, Thad E. Hall. 2007. "The New Mexico Election Administration Report: The 2006 New Mexico Election," typescript, University of New Mexico.

[vi] There is an extensive literature on how to conduct audits. See, for example, Post-Election Audit Standards Working Group. "Evaluation of Audit Sampling Models and Options for Strengthening California's Manual Count." Retrieved October 14, 2008 from http://www.sos.ca.gov/elections/elections_peas.htm

[vii] See, for example, Wolter, Jergovic, Moore, Murphy, and O'Muircheartaigh. "Reliability of the Uncertified Ballots in the 2000 Presidential Election in Florida." The American Statistician. 2003: 57, 1: 1-14.

[viii] See, for example For example, see Appel, A. W. "Effective Audit Policy for Voter-Verified Paper Ballots." Center for Information Technology Policy / Department of Computer Science, Princeton University. Retrieved July 4, 2008, from http://www.cs.princeton.edu/~appel/papers/appel-audits.pdf. (2007); Calandrino, J. A., Halderman, J. A., & Felten, E. W. "In Defense of Pseudorandom Sample Selection." USENIX/ACCURATE Electronic Voting Technology Workshop 2008. Retrieved July 23, 2008, from http://www.usenix.org/event/evt08/tech/full_papers/calandrino/calandrino.pdf. (2008); Cordero, A., Wagner, D., & Dill, D. "The Role of Dice in Election Audits---Extended Abstract." IAVoSS Workshop on Trustworthy Elections 2006 (WOTE 2006). Retrieved January 25, 2008, from http://www.cs.berkeley.edu/~daw/papers/dice-wote06.pdf. (2006); Hall, J. L. "Research Memorandum: On Improving the Uniformity of Randomness with Alameda County's Random Selection Process." UC Berkeley School of Information. Retrieved April 11, 2008, from http://josephhall.org/papers/alarand_memo.pdf. (2008); McCarthy, J., H. Stanislevic, M. Lindeman, A. Ash, V. Addona, and M. Batcher. "Percentage-based versus SAFE Vote Tabulation Auditing: A Graphic Comparison." Retrieved October 14, 2008 from www.verifiedvotingfoundation.org. (2007); Norden, L., A. Burstein, J. Lorenzo Hal, and M. Chen. "Post-Election Audits: Restoring Trust in Elections." Retrieved October 14, 2008 from http://www.brennancenter.org/content/resource/post_election_audits_restoring_trust_in_elections_executive_summary/ . (2007); Post-Election Audit Standards Working Group. "Evaluation of Audit Sampling Models and Options for Strengthening California's Manual Count." Retrieved October 14, 2008 from http://www.sos.ca.gov/elections/elections_peas.htm . (2007); Rivest, R. "On Auditing Elections When Precincts Have Different Sizes." VTP Working Paper #55. Retrieved October 14, 2008 from http://www.votingtechnologyproject.org/wps-recent.html . (2007); Rivest, R. and R. Popa. "On Estimating the Size and Confidence of a Statistical Audit." VTP Working Paper #54. Retrieved October 14, 2008 from http://www.votingtechnologyproject.org/wps-recent.html . (2007); Stanislevic, H. "NY Election Audits: Is Three Percent Enough?" E-Voter Education Project. (2007); Stark, P. "Conservative Statistical Post-Election Audits." Retrieved October 14, 2008 from http://uscountvotes.net/docs_pdf/info/US/StarkconservativeElectionAudits07.pdf. (2007)..