VSAP Mock Election Observation

Report to the Los Angeles County Registrar-Recorder/County Clerk

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Executive Summary

On September 28th and 29th, 2019, Los Angeles County held a mock election using the new VSAP (Voting Solutions for All People) system. Observers were placed in several polling places during the mock election to monitor time taken by voters to check in, time taken by voters to cast their votes, and several other questions, most notably whether or not voters showed evidence of visually verifying their printed ballot before casting it. Qualitative observations were also made. These data were collected in order to help planning for future elections and to better understand the performance of the VSAP system and the voters. Time to check-in averaged 2 minutes, 29 seconds and time to vote averaged 5 minutes and 43 seconds. Check-in time did not significantly vary from one site to another, but voting time did. Furthermore, 51% of voters showed evidence of verifying their printed ballot, and those who did averaged more than two additional minutes of voting time, suggesting this verification was not merely cursory.

Contents

1. Background and Purpose

While a complete history and description of the VSAP (Voting Solutions for All People) system is beyond the scope of this document and not necessary for the County Clerk, some background information is relevant to provide context for other audiences. Election equipment for most jurisdictions in the United States is designed and built by voting systems vendors and purchased by local election officials, generally at the county level but sometimes at the state level. Los Angeles county chose a different route, gathering input from multiple sources including voters, an advisory committee made of community leaders, and an a technical advisory committee consisting of experts in election technology. (The author of this report is a member of the technical advisory committee.) A private design firm (IDEO) was contracted to do the bulk of the design work, with extensive inputs from the county and the technical advisory committee, and another firm (Smartmatic) was contracted to handle final manufacture and system integration. This effort is unique in many respects, from the process to the final product.

The resulting system has many components. The focus of this report is the performance of voters using the actual voting machine, depicted in Figure 1. This machine is a touchscreen computer that includes multiple accessibility features (such as the headphones and the keypad on the left). The machine does not record votes electronically, but instead produces a paper ballot; it is thus what is termed a BMD, or ballot marking device. The paper ballot is the only record of the vote. Paper ballots are desirable for security and auditing purposes, but are weak on accessibility. The VSAP system is thus an attempt to provide the best of both worlds.

Figure 1. The VSAP ballot marking device (BMD)

In addition to attempting to address both security and usability concerns, these machines also enable a shift in polling places. Because these machines can present any ballot style (in any of the necessary languages), there is no need for voters to vote only a their designated precinct. Instead, voters can vote at *any* polling place, now called “vote centers.” This allows the County

to operate fewer (but larger) polling places, with much more flexibility in locating polling places (e.g., near public transit, workplaces, etc.). This change also affects the check-in procedure for voters. Since a voter can vote anywhere, there must be a mechanism in place to prevent the voter from voting more than once. This requires networked electronic poll books, a new technology for the County.

One challenge faced by the County in deploying both the BMDs and the new check-in procedures is determining exactly how many are necessary to prevent long lines at the polls. The number necessary depends on how long it takes each voter to complete both check-in and voting tasks. Because these technologies are novel, these times are unknown.

Thus, the primary purpose of this study is to collect data on how long it takes voters to check in and to vote on the new equipment.

The secondary purpose of this study is to assess what proportion of voters verify the printed ballot. The rate at which voters will do so with a BMD is something of a controversial point in the election security community.

In addition, the study also aimed to look at some other behaviors enabled by the new technology. As noted, the new BMDs were designed with accessibility in mind and support an audio mode. How many voters will use this? For those that do, how many will use this as their primary mode?

The new BMDs also supports a novel feature called PollPass. A PollPass is a QR code generated by a web-based interactive sample ballot. Voters can fill out a ballot on any web-capable device and bring the QR code to the polling place, where the BMD can scan the QR code and use it to populate the voter's ballot. As this feature was not likely to be well-known to the voters prior to the mock election, it was not anticipated that many voters would make use of it.

2. Methodology

At a high level, the methodology was straightforward: researchers went in to the polling place and observed voters, recoding how long they took to check in and to vote, and five other binary measures:

- Did the voter use a PollPass?
- Did the voter verify the printed ballot?
- Did the voter use the audio system?
- If so, did the voter use the audio system for the entire time?
- Did the voter receive assistance voting from a poll worker?

Each researcher went into the polling place with the same sheet for recoding observations (see the appendix) that included reminders regarding the instructions for how to determine the criteria for start and stop times and the five criteria.

A total of 6 polling places were visited by 6 different observers. Turnout varied widely by polling place so some sites generated very little data while other, busier sites yielded much more data.

The contents of the sheets were then transcribed and imported into a statistics package for analysis.

3. Quantitative Findings

A total of 87 voters were observed across the 6 sites. Due to circumstances, not all data were available for each voter. For example, a few voters checked in, but then did not actually vote. Some voters chose BMDs that had partially obstructed views so not all data could be collected for that voter. Obviously, this is a small sample relative to the total number of voters in Los Angeles county. However, the sample is large enough to provide interesting results, including some statistically significant comparisons. There are important qualifications to consider, which will be covered in more detail in section 5.

3.1 Check-in Time

Figure 2 provides a histogram of check-in times for the 82 voters with valid data. The average check-in time was 2 minutes and 29 seconds with a standard deviation of 2:24.[1]

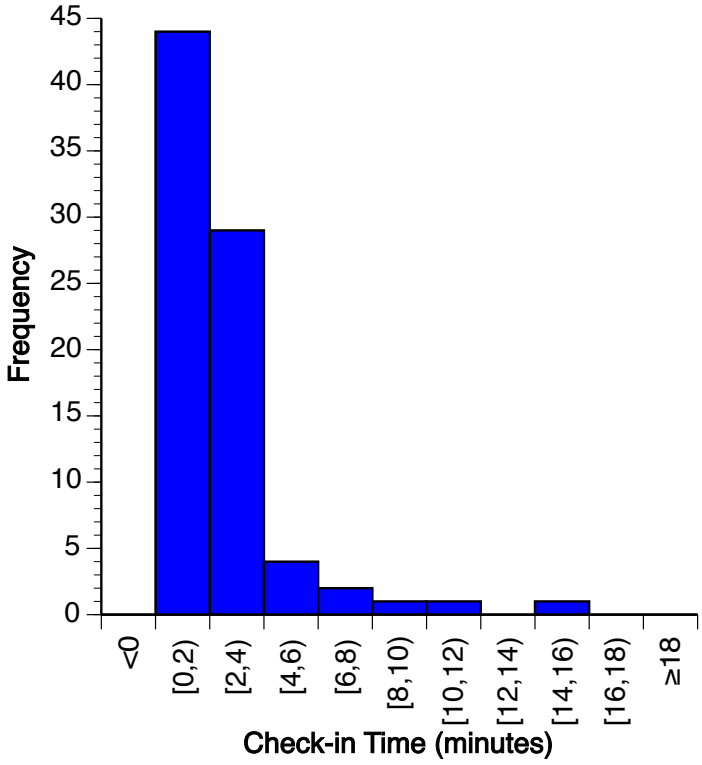

Figure 2. Histogram of check-in times

There is a great deal of variability in the data, driven primarily by two factors: a few extremely long check-in times, and then a number of extremely short check-in times. The short check-in times were driven largely by the fact that it was a mock election and people who were not

[1] 95% confidence interval: [1:58, 3:01]

registered voters were allowed to participate. In these cases there was no voter record to look up, and thus check-in was mostly just the time taken to print the blank ballot.

There was no single, obvious cause for the long positive tail in the distribution, that is, the few extremely long times, though lack of poll worker familiarity with the system was a contributing factor in at least some of these events.

There was no statistical evidence that the average check-in time differed across the 6 sites.[2]

3.2 Voting Time

Figure 3 provides a histogram of voting times for the 85 voters with valid data. The average voting time was 5 minutes and 43 seconds with a standard deviation of 2:39.[3]

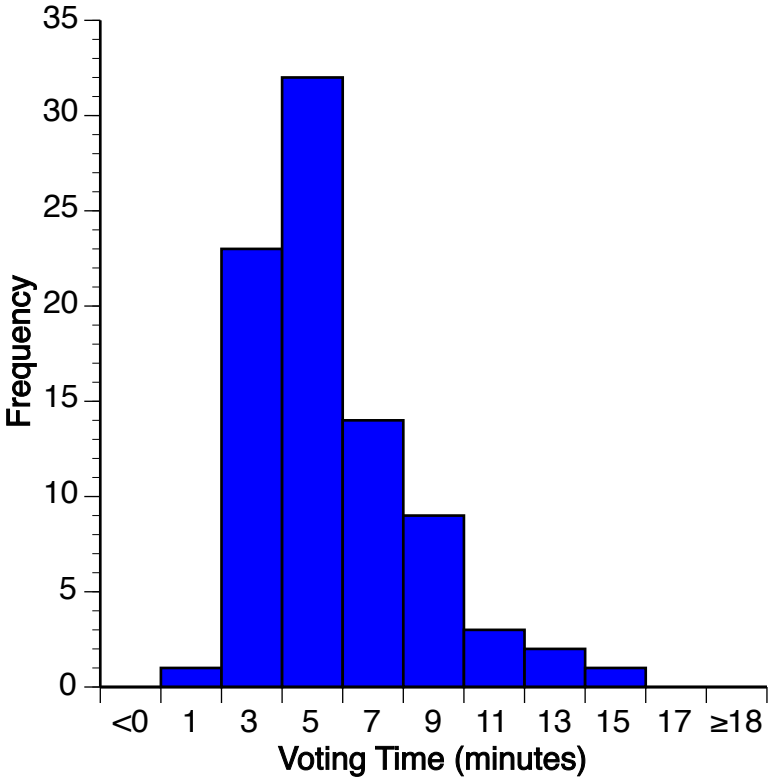

Figure 3. Histogram of voting times

Compared with check-in times, the variability was much smaller relative to the average. The minimum time was somewhat longer and while there were some long times, the overall distribution is more normal with less of an extreme tail.

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[2] $F(5, 76) = 1.03, p = .40, f = 0.26$

[3] 95% confidence interval: [5:08, 6:17]

However, unlike for check-in time, there was evidence for a difference in average voting time across the sites. Figure 4 shows the average times across the sites; this difference was statistically significant.[4] What is not clear is the underlying reason for this difference. Based on our observations, it appears much more likely that there are systematic differences between the samples of voters who went to these sites than differences in machines or administration. Differences in administration, if they were present, seem at least as likely, if not more likely, to show up in check-in times than in voting times, and there was no evidence of a difference in check-in times. Another possible explanation is differences in the observers; for more on this, see section 5.

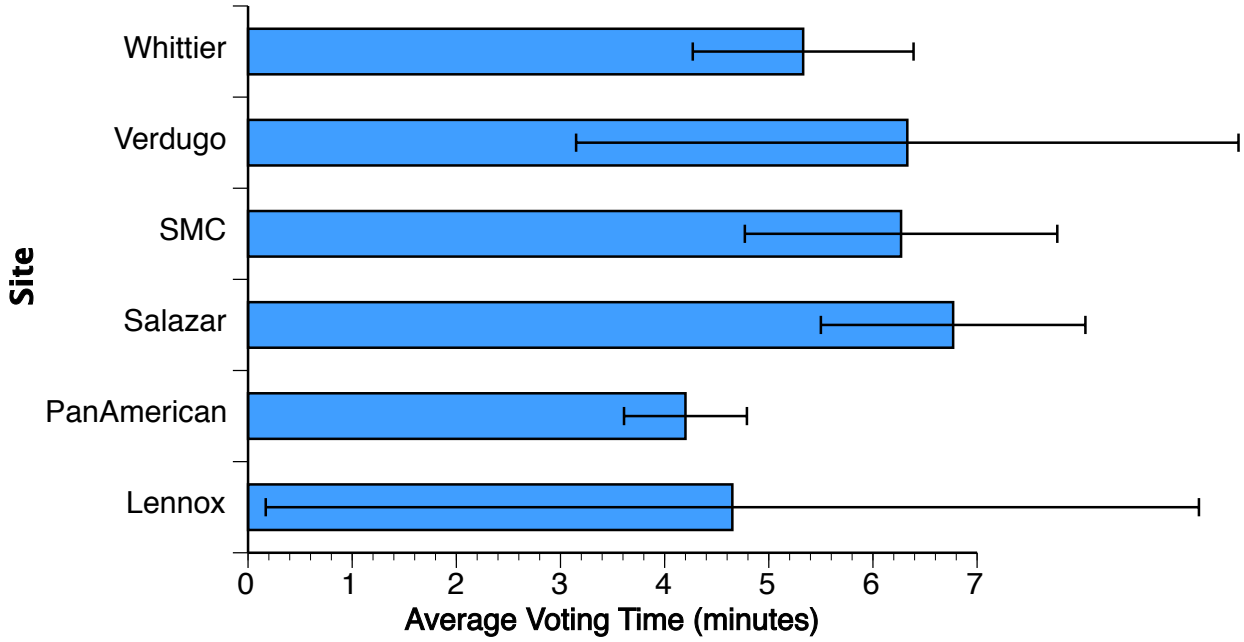

Figure 4. Average time taken to vote by site. Error bars represent 95% confidence intervals for the mean. SMC is Santa Monica College.

3.3 Ballot Verification

The frequency and accuracy with which voters verify ballots from BMDs has become the focus of some recent controversy in the voting world. Older studies of voter verification of review screens (e.g., Everett, 2007; Campbell & Byrne, 2009) suggests that the rate of verification for review screens is somewhat low, but it is not clear how relevant those results are, since review screens are not printed ballots. More recently, a group of academics has used the results of a small, non-peer-reviewed study (Appel, DeMillo, & Stark, 2019)—which suggested that few voters verify their BMD-printed ballots and those that do only do so in a cursory manner—to argue that that BMDs are inherently insecure. These academics have joined a lawsuit against the state of Georgia with the intent of preventing statewide deployment of a commercial BMD system there. This commercial system (ES&S ExpressVote) differs substantially from the VSAP

[4] $F(5, 79) = 2.93, p = .018, f = 0.43$

BMD and produces a printed ballot that is both physically smaller and substantially more difficult to read than the VSAP ballot.

A critical question, then, is what proportion of voters verify their VSAP ballots before casting them, and is there evidence that those who do review their ballot do so in more than just a cursory manner? A mock election such as this one does not, perhaps, provide the ideal venue for answering these question since the results of a mock election have no real impact; the voters thus have less potential motivation for taking the time to verify than they would in a real election. This is far from a best-case scenario.

Despite this, 41 of 81 voters (51%) verified their paper ballot prior to casting it. Furthermore, timing data strongly suggests this review was not merely cursory. Figure 5 presents the average time for voters who did and did not verify their ballots. Voters who verified their ballots averaged 2 minutes and 10 seconds longer to vote than voters who did not. This difference is statistically significant.[5]

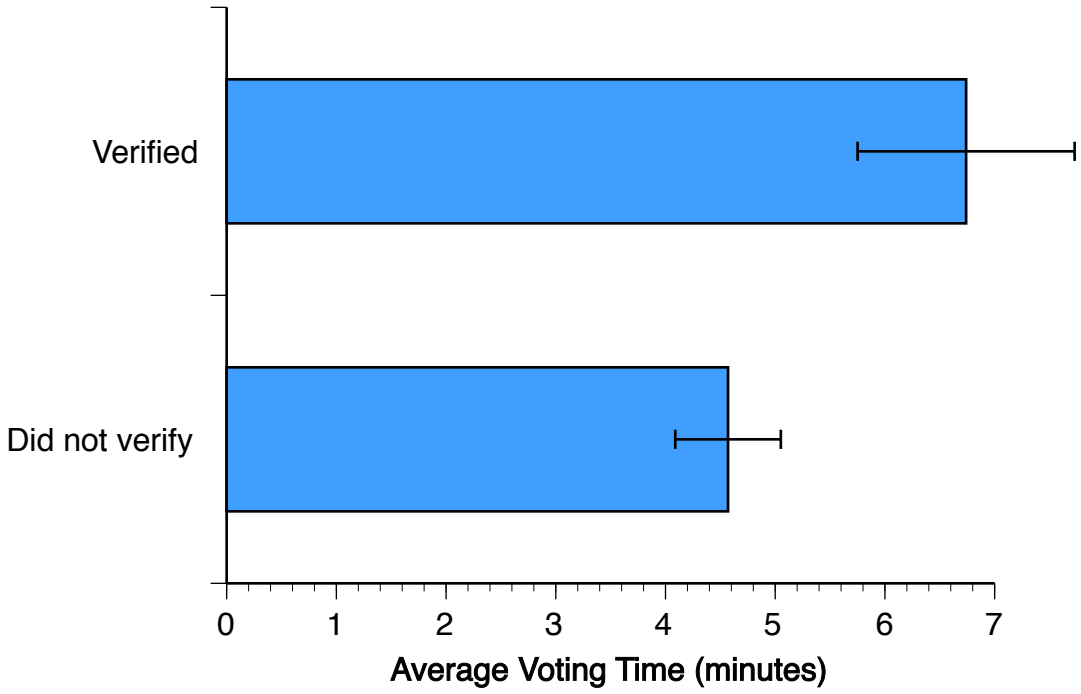

Figure 5. Average time taken to vote for voters who did and who did not verify their paper ballot prior to casting it. Error bars are 95% confidence intervals for the mean.

This result provides grounds for cautious optimism regarding voter verification of the VSAP-produced paper ballot.

[5] $t(79) = 3.95, p < .001, d = 0.88$

3.4 Other Quantitative Results

While the previous sections detail the most central quantitative results, there were other questions raised that also need to be addressed.

Only 3 of 82 voters used the audio (3.7%), and only 1 voter used audio for the entire time spent voting (1.2%). Voters who used the audio did take longer, on average, to vote: 9 minutes and 43 seconds on average for those who used the audio vs. 5:29 for those who did not. Despite the small number who used audio, this difference is statistically significant.[6] This is not particularly surprising as auditory interfaces are usually slower.

59 of 81 voters (72.8%) of voters received assistance from a poll worker. While this number is high, this is most likely driven largely by the low turnout. Poll workers were often idle and offered assistance to many voters who did not explicitly request it, and since it was a mock election voters were not concerned about poll workers seeing their ballots. While the average time (5:01) for those who did not receive help was shorter than for those who did (5:53), this difference was not statistically significant.[7]

Only 2 voters were observed using PollPass, both at the Santa Monica College site.

4. Qualitative Results

The more casual environment of the mock election, the low turnout, and the newness of the VSAP system resulted in an environment where both voters and poll workers felt it appropriate to engage the observers and comment on the experience, which produced some potentially valuable insights. In general, these comments were generically positive, e.g., "I really liked it," "It is much easier than the old system," and the like.

However, there were specific concerns raised. The most common concern, voiced by both voters and poll workers, was the tight physical spacing of the BMDs makes it easy for people to see what other voters are doing. This concern has previously been raised at TAC meetings and solutions like privacy film have been discussed.

There were two concerns voiced by both voters and poll workers about the user interface of the BMD itself. The first concern regards races where more than one selection is allowable (i.e., "*k* of *n*" races). This is not salient enough on the BMD screen and apparently many voters did not realize in these cases that they could select more than one choice. Second, there was concern expressed about scrolling the display. That is, when there are many possible options, the BMD has a "More" button at the bottom of the display to scroll to the next screen of options. Again, many voters missed this. Addressing these would require changes to the BMD software, which is obviously not trivial but is easier to address than a hardware change would be.

Many of the other issues involved the check-in process, which like the BMDs are new for both the voters and the poll workers. Some of these issues will be addressed simply by the poll

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[6] $t(80) = 2.80, p = .006, d = 1.65$

[7] $t(79) = 1.29, p = .20, d = 0.32$

workers getting more experience with the system. Poll workers seemed slower with the first few voters on Saturday morning, driven apparently by unfamiliarity with the system. One particular snag that led to a long check-in time was a voter with a common first name and a common surname (e.g., "Jane Smith"). The poll worker clearly internalized the training that they were to use the first three letters of both names, but this did not narrow down the list enough. The poll worker did not seem to know that three was not a limit and that they could type more to further narrow the search results.

Another oft-cited issue for the check-in poll workers was paper alignment with the printer. There was a perception that the printers are a bit finicky in this regard and ballot would occasionally not print, or not print properly, if the alignment was off as the blank ballot was fed in. On the other hand, there were some poll workers who did not seem to have any trouble with this.

Another observation regarding poll workers and paper feeding: the fastest check-in poll workers used a clever strategy. When they flipped the tablet over to the voter for sign-in, that's when they got the paper set up for printing. This only saved a few seconds for each voter, but it both gave the poll worker something to do while the voter was signing and meant the voter had to wait a little bit less between signing and receiving their ballot. This could be mentioned in poll worker training.

Finally, a few voters expressed concerns regarding security and the BMDs being hacked. This is likely a voter education issue, as in general the voters who expressed this were not aware that the BMDs do not record votes.

5. Study Limitations

No empirical study is perfect and this one is no exception. It is important to acknowledge, rather than attempt to hide, limitations so that conclusions are not over-generalized.

The first and most conspicuous limitation is that the election was a mock election, not a real election. This has numerous implications, some obvious and some less so. First, the voters who turn out for a mock election are likely different than those who turn out for a real election, both in number (turnout was small for the mock election) and in composition. They also differ in terms of motivation and concern for privacy; voters were not particularly concerned if anyone knew how they voted in the mock election. The low turnout likely influenced behavior of the poll workers as well, since they did not have to contend with lines. This is a lower-stress environment for both voters and poll workers and this may have contributed to the overall positive impression of the system.

Another important aspect of it being a mock election is the ballot itself. The ballot used here was much shorter than the ballot voters face in a typical general election, which means that the observed voting times may be too low. However, voters in the mock did not know the contents of the ballot in advance and so could not have prepared their responses, which means that per race, many of them probably took longer here than they would in a real election. It is possible that these two factors cancel each other out, but that seems somewhat optimistic. Thus it is not entirely clear whether the times taken are an over-estimate, an under-estimate, or an accurate

estimate of true voting times. This does not mean the data are useless; even if these data serve as lower bound, that still provides information that is relevant to planning allocation of machines. It is important to note that ballot length and content should not have any affect on check-in times.

The other thing about a mock election is that voters are less incentivized to be accurate. Thus, voters may have been less likely to go back and correct any errors they made, and probably less likely to detect them in the first place. This again suggests that true voting time may be longer per race than what was seen here. On the other hand, the lower stakes of the mock election would certainly suggest that voters would be less diligent in examining their printed ballots than they would in a real election. Perhaps this is compensated for by the lack of perceived time pressure due to the low turnout. Clearly, further observation is warranted on this.

The second limitation is that the overall size of the sample is, due to the low turnout, smaller than what was hoped for. While the sample is clearly large enough to support some conclusions based on inferential statistics, there may be other differences that would be evident had the sample been larger. The number of sites sampled was also not large, and thus potentially limits the extent to which these data will generalize to the larger L.A. County voting population.

Finally, there were some data collection issues. All data collected by one observer was excluded because data recorded by that observer was impossible given the instructions; this is almost certainly the fault of the training not being clear enough.

In addition, there may be some differences in the data that are due to the different observers. Because some of the observers went to only a single site, and at most two sites, it is impossible to de-confound effects of observer from effects of voting site. Indeed, the different observers did produce a statistically significant difference in mean voting time that was similar in size to the differences found between sites.[8] However, they did not produce such a difference in frequency of voters coded as having read their ballot.[9] Again, this is a worthy subject for follow-up research.

6. Acknowledgments

I would like to thank the Los Angeles County Registrar-Recorder/County Clerk for not just allowing us to do this research, but supporting it. I would also like to thank his staff and all the poll workers at the various voting sites who helped out, with special thanks to Monica Flores and Adrian Farran. I would like to thank Ihaab Syed for coordinating the volunteer observers from UCLA, and the observers themselves: Ronak Patel, Nicole Hansen, Gabriel Durkin-White, and Poren Chiang. Finally, thanks to my graduate student Xianni Wang for traveling and observing with me, and undergraduate Tina Liu for assistance in data coding.

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[8] $F(4, 80) = 4.08, p < .001, f = 0.45$

[9] $F(4, 76) = 1.55, p = .20, f = 0.29$. Note that a logistic regression is actually more appropriate here than an ANOVA for the binary dependent variable. The logistic regression produces similar non-significant results, $p = .18$.

7. References

Appel, A., DeMillo, R., & Stark, P. (2019). Ballot-marking devices (BMDs) cannot assure the will of the voters. Available at SSRN: https://ssrn.com/abstract=3375755

Campbell, B. A., & Byrne, M. D., (2009). Now do voters notice review screen anomalies? A look at voting system usability. In *Proceedings of the 2009 USENIX/ACCURATE Electronic Voting Technology Workshop/Workshop on Trustworthy Elections (EVT/WOTE)*.

Everett, S. P. (2007). The Usability of Electronic Voting Machines and How Votes Can Be Changed Without Detection. Doctoral dissertation, Rice University, Houston, TX.

8. Appendix

The following pages provide the form used by the observers to record data at polling sites.

VSAP Mock Election Time Study

Polling place: _____ Your name: _____

Time of arrival: _____ Time of Departure: _____

Instructions: Use a phone or digital watch/stopwatch that shows seconds to record the exact time for each step in the voting process of individual voters. Please record time as hour : minute : second.

The "Note" column is only to help you keep track of each voter you are timing. It should be a distinctive piece of clothing or other item worn or carried. Please do not use gender, race, age, or other personal/demographic characteristic as voter identification.

Track an individual voter through the entire process, then start with the next voter who arrives at the end of the line. If there is a line, note how long the line is. If there is no line and the voter can proceed directly to check-in, leave the "before check-in" section blank.

If you lose track of a voter, or fail to record a particular time, put an X in the appropriate spot and then proceed to the next step.

Circle "Y" or "N" for each of the five questions for each voter. If you cannot tell for that question, don't circle anything.

		Before check-in			Check-in		Voting						
#	Note	Start	End	# in line	Start	End	Start	End	PollPass used?	Read ballot?	Audio?	Full Audio?	Ask for help?
1		: :	: :		: :	: :	: :	: :	Y N	Y N	Y N	Y N	Y N
2		: :	: :		: :	: :	: :	: :	Y N	Y N	Y N	Y N	Y N
3		: :	: :		: :	: :	: :	: :	Y N	Y N	Y N	Y N	Y N
4		: :	: :		: :	: :	: :	: :	Y N	Y N	Y N	Y N	Y N
5		: :	: :		: :	: :	: :	: :	Y N	Y N	Y N	Y N	Y N
6		: :	: :		: :	: :	: :	: :	Y N	Y N	Y N	Y N	Y N
7		: :	: :		: :	: :	: :	: :	Y N	Y N	Y N	Y N	Y N

		Before check-in			Check-in		Voting							
#	Note	Start	End	# in line	Start	End	Start	End	PollPass used?	Read ballot?	Audio?	Full Audio?	Ask for help?	
8		: :	: :		: :	: :	: :	: :	Y N	Y N	Y N	Y N	Y N	
9		: :	: :		: :	: :	: :	: :	Y N	Y N	Y N	Y N	Y N	
10		: :	: :		: :	: :	: :	: :	Y N	Y N	Y N	Y N	Y N	
11		: :	: :		: :	: :	: :	: :	Y N	Y N	Y N	Y N	Y N	
12		: :	: :		: :	: :	: :	: :	Y N	Y N	Y N	Y N	Y N	
13		: :	: :		: :	: :	: :	: :	Y N	Y N	Y N	Y N	Y N	
14		: :	: :		: :	: :	: :	: :	Y N	Y N	Y N	Y N	Y N	
15		: :	: :		: :	: :	: :	: :	Y N	Y N	Y N	Y N	Y N	
16		: :	: :		: :	: :	: :	: :	Y N	Y N	Y N	Y N	Y N	
17		: :	: :		: :	: :	: :	: :	Y N	Y N	Y N	Y N	Y N	
18		: :	: :		: :	: :	: :	: :	Y N	Y N	Y N	Y N	Y N	
19		: :	: :		: :	: :	: :	: :	Y N	Y N	Y N	Y N	Y N	
20		: :	: :		: :	: :	: :	: :	Y N	Y N	Y N	Y N	Y N	
21		: :	: :		: :	: :	: :	: :	Y N	Y N	Y N	Y N	Y N	
22		: :	: :		: :	: :	: :	: :	Y N	Y N	Y N	Y N	Y N	
23		: :	: :		: :	: :	: :	: :	Y N	Y N	Y N	Y N	Y N	
24		: :	: :		: :	: :	: :	: :	Y N	Y N	Y N	Y N	Y N	
25		: :	: :		: :	: :	: :	: :	Y N	Y N	Y N	Y N	Y N	
26		: :	: :		: :	: :	: :	: :	Y N	Y N	Y N	Y N	Y N	

		Before check-in			Check-in		Voting							
#	Note	Start	End	# in line	Start	End	Start	End	PollPass used?	Read ballot?	Audio?	Full Audio?	Ask for help?	
27		: :	: :		: :	: :	: :	: :	Y N	Y N	Y N	Y N	Y N	
28		: :	: :		: :	: :	: :	: :	Y N	Y N	Y N	Y N	Y N	
29		: :	: :		: :	: :	: :	: :	Y N	Y N	Y N	Y N	Y N	
30		: :	: :		: :	: :	: :	: :	Y N	Y N	Y N	Y N	Y N	
31		: :	: :		: :	: :	: :	: :	Y N	Y N	Y N	Y N	Y N	
32		: :	: :		: :	: :	: :	: :	Y N	Y N	Y N	Y N	Y N	
33		: :	: :		: :	: :	: :	: :	Y N	Y N	Y N	Y N	Y N	
34		: :	: :		: :	: :	: :	: :	Y N	Y N	Y N	Y N	Y N	
35		: :	: :		: :	: :	: :	: :	Y N	Y N	Y N	Y N	Y N	
36		: :	: :		: :	: :	: :	: :	Y N	Y N	Y N	Y N	Y N	
37		: :	: :		: :	: :	: :	: :	Y N	Y N	Y N	Y N	Y N	
38		: :	: :		: :	: :	: :	: :	Y N	Y N	Y N	Y N	Y N	
39		: :	: :		: :	: :	: :	: :	Y N	Y N	Y N	Y N	Y N	
40		: :	: :		: :	: :	: :	: :	Y N	Y N	Y N	Y N	Y N	
41		: :	: :		: :	: :	: :	: :	Y N	Y N	Y N	Y N	Y N	
42		: :	: :		: :	: :	: :	: :	Y N	Y N	Y N	Y N	Y N	
43		: :	: :		: :	: :	: :	: :	Y N	Y N	Y N	Y N	Y N	
44		: :	: :		: :	: :	: :	: :	Y N	Y N	Y N	Y N	Y N	
45		: :	: :		: :	: :	: :	: :	Y N	Y N	Y N	Y N	Y N	

		Before check-in			Check-in		Voting							
#	Note	Start	End	# in line	Start	End	Start	End	PollPass used?	Read ballot?	Audio?	Full Audio?	Ask for help?	
46		: :	: :		: :	: :	: :	: :	Y N	Y N	Y N	Y N	Y N	
47		: :	: :		: :	: :	: :	: :	Y N	Y N	Y N	Y N	Y N	
48		: :	: :		: :	: :	: :	: :	Y N	Y N	Y N	Y N	Y N	
49		: :	: :		: :	: :	: :	: :	Y N	Y N	Y N	Y N	Y N	
50		: :	: :		: :	: :	: :	: :	Y N	Y N	Y N	Y N	Y N	
51		: :	: :		: :	: :	: :	: :	Y N	Y N	Y N	Y N	Y N	
52		: :	: :		: :	: :	: :	: :	Y N	Y N	Y N	Y N	Y N	
53		: :	: :		: :	: :	: :	: :	Y N	Y N	Y N	Y N	Y N	
54		: :	: :		: :	: :	: :	: :	Y N	Y N	Y N	Y N	Y N	
55		: :	: :		: :	: :	: :	: :	Y N	Y N	Y N	Y N	Y N	
56		: :	: :		: :	: :	: :	: :	Y N	Y N	Y N	Y N	Y N	
57		: :	: :		: :	: :	: :	: :	Y N	Y N	Y N	Y N	Y N	
58		: :	: :		: :	: :	: :	: :	Y N	Y N	Y N	Y N	Y N	
59		: :	: :		: :	: :	: :	: :	Y N	Y N	Y N	Y N	Y N	
60		: :	: :		: :	: :	: :	: :	Y N	Y N	Y N	Y N	Y N	
61		: :	: :		: :	: :	: :	: :	Y N	Y N	Y N	Y N	Y N	
62		: :	: :		: :	: :	: :	: :	Y N	Y N	Y N	Y N	Y N	
63		: :	: :		: :	: :	: :	: :	Y N	Y N	Y N	Y N	Y N	
64		: :	: :		: :	: :	: :	: :	Y N	Y N	Y N	Y N	Y N	

Reminders for the five Y/N questions

PollPass: The new voting machine allows a completely new way to vote. Voters can complete their ballot in advance, then have the selections represented in an QR code. The voting machine can scan the QR code and fill in the voter's selections from that. So, what you are looking for here is the voter holding a piece of paper or a cell phone to the scanner, which is located just under the paper feed on the right side of the voting machine. If the voter attempts to scan something, circle Y, otherwise circle N.

Read Ballot: For security and auditing reasons, the new voting machines do not store votes electronically. Instead they produce paper ballots. We are interested in whether or not the voters actually check the paper ballot. If, after the ballot is printed by the machine, the voters spends more than 5 seconds looking at the paper ballot, circle Y, otherwise circle N.

Audio: The new voting machines support many accessibility features, including providing instructions and ballot navigation via an audio system. There are headphones attached to the voting machine for this purpose. If the voter puts the headphones on (or plugs in their own), circle Y, otherwise circle N.

Full Audio: If the voter wore the headphones for the entire time they voted, circle Y, otherwise circle N.

Ask for help: If, while voting, the voter asked a poll worker for assistance, circle Y, otherwise circle N.