n September 7, 2004, I traveled to Reno and Sparks, Nevada with members of the California Secretary of State poll-watching effort. We observed a rollout of new Sequoia direct-record electronic voting systems with verifiable paper-trail printers. I watched everything I could and conducted interviews with poll workers, election officials, and exiting voters at eleven different polling places covering almost forty precincts.

What I saw both encouraged and horrified me. The paper “receipts” were less confusing than I had feared. Poll workers and voters alike showed an eagerness to “get it right,” even when initially frustrated. However, things went bad when workers had inadequate time to set up or test equipment, when procedures were ignored or forgotten, or when no standard policy existed to provide guidance.

The Reno polling places I visited were spacious, well-lit, clean, and wheelchair-accessible. One had an ATM machine, which one voter mistakenly attempted to shove his card into; it gave his card back.

I was surprised at the sheer number of machines—twenty in every location. These were lined up in two long, squashed rows, typically with fifteen feet between the rows and with voters’ backs facing each other. Any voter could watch how his neighbor was voting. Standing in the center of the room one could read everyone’s ballots. Set ups I recently observed in Los Angeles and Boston showed greater sensitivity to preserving privacy. There, machines were arranged in a square, each facing outward.

The Reno machines had been set up on Saturday and Sunday and then left locked, but unguarded, in a church until the Tuesday election. (Many other jurisdictions do not allow elections to be held on the day after a holiday.) It would not have been unduly expensive or complicated to place numbered seals that tear when tampered with on polling place doors.

Start-up Problems and Responses

This September 7, 2004, was the Sequoia Voting Systems computerized voting machines’ public debut. The introduction included a number of problems due to lack of procedures, lack of instructions, and insecure handling of the ballots, but no evidence of any kind of fraud. A machine at one location had been shut down since the beginning of the election because the touchscreen wouldn’t work. Approximately one in every twenty printers jammed. A couple who I met complained that one of them had to have a smart card reprogrammed three times before they could vote. Smart card programming problems were not uncommon. However, troubleshooters from Sequoia and election
Running on Battery

When I returned to this location at 10:00 a.m., a frazzled poll worker reported, "At 8:30 a.m., all the machines began shutting down here; the outlets were not active." In the morning rush, workers had plugged the voting machines into a dead circuit and accidentally ran them on battery power. While I had photographed a red battery warning screen earlier, no one else had been troubled by it, nor had they taken heed of the red bar on the bottom of the touchscreen that indicates when machines are running on battery. An improve-
mment might be to have the words, "Operating on battery; alert poll worker," in the red bar.

Poll workers then used a single fifty foot extension cord to plug ten machines into an outlet, which also had a microwave plugged into it. The high current in the extension cord made it warm to my touch. I couldn’t help pointing out that they might unplug the microwave to avoid overloading the circuit. The poll workers explained that they would not use it.

Wrong Ballot Codes

Disenfranchised Some People

Voters at the same location realized that they had been prompted to vote only for senator and not for the six other local races on the ballot. A provisional ballot allows a voter to vote for federal races if they are not on a precinct’s registration list. The poll workers had accidentally programmed ballots with the provisional ballot codes (PCT0000: Democrat and PCT0000: Republican), which were taped near the front of the activator box, instead of the specific precinct ballots codes that were taped to the box above the keypad. A frustrated poll worker in one precinct moved the provisional ballot codes pasted on the front. Center: Card activator with the provisional ballot codes partially torn away. Right: Voters who accidentally voted using provisional-ballots.

User Satisfaction Was High

I saw many people touching their pencils to the well-designed Help America Vote Act (HAVA) complaint instructions on the right of the touch screens for assistance. Even though most voters had been given no guidance on how to use the electronic voting machines, they thought them an improvement.

One bewildered voter said, "The punch card was great," and wanted a copy of his printout. More typical comments were: "Very much easier than punch cards," "Very easy," "Much easier," and "Quicker, cleaner, with less room for error." One voter said, "The electronic voting machine made it seem more official than the punch card." Another stated, "It’s obvious what you are voting for. The recap is nice." An elderly woman with a walker progressed extremely slowly through her ballot. Nevertheless, she described the screen as "easier to read" and as "a lot easier than the type where you fill in a circle" (she was referring to an optical-character-recognition system).

One voter happily explained, "I looked at the review screen and noticed that the State Supreme Court race that I care about was not selected, so I went back and fixed it." There were some complaints. Someone remarked, "I didn’t know how to end. It [the machine] kept saying to return and keep going back." Others had some trouble finding the small buttons that said "Touch," "Print," and "Review" at the bottom of the screen. An onscreen display offering these functions in larger type would be an improvement.

No Voting Instructions

Only one location I visited offered all voters printed instructions with graphic illustrations. Another was careful to explain how the machines functioned. In most places, however, voters were left to walk up to the machines and read the instructions themselves. People shouldn’t have to figure out how to use voting machines on their own. Nor should they have to forfeit their right to secrecy by seeking assistance while in the act of voting.

Voters’ sample ballots were mistakenly miss-
inning voting machine instructions. A poll worker told me that a verbally instructed all voters. Among other things, her explanation included, "Put the card in the screen," an action that was not only incorrect but also physically impossible. “Don’t use your fingers," I overheard her tell someone else. "They make our machines com-
ier to read" and as "a lot easier than the type

though the machines showed paper receipts, one person grumbled, "How do I know that my vote counted without a paper receipt?"

"Receipt" or "Record?"
The Reno and Sparks voters could not view their onscreen selections while confirming the printouts. Nevertheless, they typically swore that their “receipts” exactly matched their elec-
tronic selections. Because people make, on average, 1–3 percent errors using direct elec-
tronic register machines, this suggests that some voters did not closely review the print-
outs. In an election with seven races, one in seven voters can be expected to have a dis-
crepency between what was printed on the receipt and what he or she intended.

As a result of pre-election publicity, most of the voters expected the receipts and glanced at them. One voter said, “I checked,” another, “I
heard it’s new”, and a third, “I wasn’t really inter-

Many people were not exactly sure what the

receipts were for. A number of voters

moved their hands over the plastic box trying
to figure out where the paper came out. One
person remarked, “Receipt for me or what?
Not sure what they need to let us see that for.”
“Where is my receipt?” asked another. “I think
the voters should get a copy,” someone else
affirmed. The term “record,” which Sequoia
uses, is less confusing.

Access and Privacy

We saw almost no Hispanic voters. I met
only one official Spanish interpreter. At three
o’clock in the afternoon, he had only received
two requests for help.

One polling place in a low-income area
was almost completely empty. At another, in a
neighborhood filled with trailer homes and
barred windows, poll workers zealously hov-
ered over voters in the booths. Any pretense of
anonymity or secrecy went out the window.

Integrity of the Vote

Misdirected poll worker behavior, however
well-intentioned, eroded the election’s integrity
throughout the day. One poll worker explained
her technique for handling troublesome smart
cards: “If the card doesn’t work, you just turn
to the machine and put the card in a box not
to be used.” Someone who wanted to shut
down an entire polling place could use that
policy and disable all the machines.

At another location, a paper-trail printer
stood open on a counter. “They told us to
replace the paper if it jammed,” a poll worker
explained. Her instructions included nothing
about how to retrieve the paper (the instruc-
tions at some polling places did and, at others,
didn’t) so she struggled to figure it out on her
own. To help fix the paper jam, she used a pair
of scissors to cut some voter records off.

At all but one location, only the warden had
been specifically instructed on how to put paper
in the new printers. However, she was never
taught that a paper-trail printer should be han-
dled with the same care and security protocol as
a ballot box. I could imagine her taping the roll
inside the printer ballot box and wonder if it
would be found later. A second official should
monitor the opening and closing of this paper-
trail ballot box on the day of election.

Similarly, when we returned to the County
Campus to watch the polling place being shut
down, the two women who intended to write
down the readings separately forgot to do so.
The process was unfamiliar and unpracticed.

When I asked the official responsible for
counting results how he intended to back them
up, he said that he hadn’t quite decided. With
further prompting, he confessed that he had
not made any particular plans to burn a back-
up CD in case something happened to the
original results.

The counting room had five open doors
and extraneous objects, and the voting servers
had slots for the memory cards and extra USB
connectors. The ease with which someone
might install a memory-transfer device in the
counting machines gave me a start. It was a
particularly frightening end to a long day.

Conclusions

Elections do not happen every day. The
tasks that poll workers need to do when elec-
tions take place are not, therefore, ingrained
by force of habit and repetition. Poll workers
and voters alike need instruction. A checklist of oper-
ating procedure from start to finish must be
mapped out and practiced. Poll workers must
demonstrate that they can do their jobs before
Election Day comes around so that mistakes do
not compromise the integrity of actual elections.

Every time that an election worker turns on
a voting machine, copies down odometer num-ers, opens a printer, programs a smart card,
or views tally results on a backend computer,
he or she should be accompanied by someone
who can corroborate the correctness of these
actions. Moreover, every person working at a
polling place should be given a laminated
checklist of instructions, which might even be
worn around the neck. This would eliminate
 guesswork and the need to remember impor-
tant but counterintuitive tasks.

As we become more dependent upon
technology, we must test this equipment for
functionality and usability as well as for
security. Breakdowns occur and we must be
ready for them. A standard method for han-
dling such situations must be designed so
that poll workers can fix problems such as
paper jams without compromising the safety
or secrecy of the paper-trail receipts.

The problems I encountered with the
Sequoia electronic voting machines and
paper-trail audit system resemble those I have
seen with every kind of voting system in
precincts throughout the country. Since becom-
ing involved in the Caltech/MIT Voting
Technology Project in 2001, I have witnessed
elections in hundreds of jurisdictions across
America. Luckily, most of these problems can
be solved if we focus on improving both train-
ning and process and the usability of the
machines and instructions. It is not too soon to
start planning for the next election.

Postscript: The election officials took notes
on my report. The Sequoia voting machines
with paper trails used in Reno and Sparks in
the November 2, 2004, presidential election
appear to have reduced the number of errors
in Nevada significantly.

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