

A Potential Solution to Electronic Vote Theft in Optical Scanner Elections: TEVS -- an independent same-day re-scan/tabulation

Dick Atlee, 19 January 2016

(<http://dickatlee.com/issues/elections/evote/tevs.html>)

Carolyn Crnich, a forward looking election registrar (<https://vimeo.com/39740758>) in Humboldt County, CA, responded to the concerns of two commercial fishermen about the non-transparency of the optically scanned vote in the county. From this developed the Humboldt Transparency Project, in which software developer Mitch Trachtenberg (<http://www.mitchtrachtenberg.com/>) developed the Transparent Election Verification System (<http://player.vimeo.com/video/35785956>). TEVS is open-source software (source code is online and free to download) that can scan ballots using an off-the-shelf scanner, extract the data from them, and put the data in a spreadsheet, from which simple procedures can be used to produce election results that can be checked against the official ones. It goes like this:

1. Each polling place (and the central or regional scanning locations) that is using a voting machine company's optical scanner is supplied with a separate, inexpensive off-the-shelf scanner (or more than one, proportional to the voting load); or it can use its own scanner.
2. After the election closes, the people who would normally be called upon to count the ballots instead shuffle them (to foil any preplanned fraud) and feed them through the scanner. This occurs at the rate of around 2000 ballots per hour, faster than most humans can operate.
[Note: election officials often say they have a hard time finding volunteers for counting or poll work. One solution to this -- even for our current system -- would be to encourage the use of high school community service time. But in any case, this audit method has less of a manpower/time requirement than the current system, thus minimizing late nights and human error.]
3. The scanned ballot images are digitally signed and sent to an independent organization -- or more than one such organization in order to increase credibility of the results. If there's any question about the accuracy of a given image, it has the serial number of the original ballot and can be compared.
4. The organization (or organizations) run the TEVS software on the ballot images to produce spreadsheets. In the case of a Ranked Choice Voting (RCV) race of N candidates, N columns of the spreadsheet -- one for each possible ranking -- would be assigned to each candidate. TEVS takes about 1 second per ballot on mid-range hardware.
5. For a plurality race, simply using the spreadsheet's SUM function is sufficient to determine all aspects of the race. For RCV races, the spreadsheet is sorted into the various permutations of rankings (i.e., for a 3-person race, the possible rankings are 123, 132, 213, 231, 312, 321). A simple manual RCV manipulation of these identifies the winner.
6. The spreadsheet and list of permutations are provided as public documents so that anyone can check them.

This is a totally transparent method for verifying the official results determined by non-transparent voting tabulation firmware/software, and not dependent on randomized selection of audit or recount sites. It solves the entire election integrity problem. However, it has a number of pre-requisites:

1. **No touch screens** -- Any rules/laws specifying touch-screen technology as the equipment to be used for voting must be changed to specify either optical scanners or hand counting.
2. **Adapting the TEVS software** (the source code is free, it currently runs under Linux) -- an easy project for a college computer science class.
3. **Procurement of inexpensive scanners** -- chicken-feed in terms of bang-for-buck, though money would be saved on the lack of licensing fees for the open-source software).
[Note: scanner procurement is optional -- a site can simply use its own scanner, in which case a Linux driver for such a scanner needs to be included in that site's TEVS implementation.]
4. **Ballots must have serial numbers**, which is also a protection against substitution of photocopied ballots.
5. **Public records** -- Any law that holds that ballots or ballot images are *not* public records must be changed. *[Note: Given the importance of elections to the health of our democracy, why shouldn't they be public records? In the past, the greatest opposition to this policy has come from the voting machine companies, and you have to ask yourself, "Why?"]*
6. Any law stating that audits and recounts must be done by hand would not affect this, since this is not an official tally.

None of this is complicated, though -- regarding its chances of implementation -- the Humboldt County folks have found that most election officials outside their county are not sympathetic to proposals that change their usual way of doing business. The question is, as the issue of electronic vote theft heats up, will the simplicity and transparency of the TEVS technique induce public pressure on such officials?