The Ranked Choice Voting Trade-off

Dick Atlee
21 January 2016

Ranked Choice Voting (RCV) offers at least three electoral benefits:

1. Elections in which a winner gets at least a majority (if perhaps a tepid one)
2. Better demonstration of the strength of non-front-runners without suffering the "spoiler" effect
3. A tendency towards more civil campaign discourse

On the other hand, RCV has one potentially significant drawback:

> ***It depends on machine counting and analysis of ballots. For those with a familiarity with the massive amount of evidence of computerized electoral theft over the past fifteen years, this is a serious concern -- a concern that can only be allayed if a method exists for an audit of the results that is***
> ***(a) independent -- i.e., not a simple re-run on the machines -- and***
> ***(b) formally implemented in rules and law.***

The Maine we know tends to be populated by dedicated civil servants and reasonable citizens who probably are much less likely to mess with elections than those in many other states. But times and people can change. Should we not have a system that survives such changes? In any case, the character of Mainers may be beside the point. Maine has already experienced the mass dumping of false political ads by entities outside our borders. Other such entities are very much interested in gaining control of statehouses and legislatures, and have demonstrably done so (e.g., in 2010). So the hacking of our elections is by no means unthinkable.

Because of this, choosing RCV involves a choice (some would say a Faustian choice) between

> ***• relatively short-term election improvements, and***
> ***• the possibility of assuring that future elections are not being hijacked***

This set of handouts examines the factors involved, and whether there is or isn't a way to have both.

Contents

Why does an essentially liberal country -- as evidenced by the large number of ballot initiatives nationwide that would normally be considered "liberal" passing with large majorities -- elect conservative people who are dead set against those initiatives? This clear question-and-answer format book provides arguably the most likely answer.

Code Red: Computerized Election Theft and the New American Century

Jonathan Simon

http://codered2014.com/, http://www.amazon.com/dp/1500319856/

Excellent interview (Nov 12, 2014): http://www.kpfa.org/archive/id/108384

11-point Summary

(http://dickatlee.com/issues/elections/evote/code_red_summary.pdf)

1. The right-wing plan to take over the country was in gear by 2002, with the Help America Vote Act (HAVA), from which poured the era of electronic control of voting. Mitch McConnell sold it to the Dems as a way to increase turnout (I mean, what were they thinking?!! Since when have Republicans wanted to increase turnout?). Then HAVA was nailed into place by claiming it would help those with disabilities, though methods were already in place to handle their problems. From then on, any questioning of electronic voting or vote tabulation was attacked as anti-disability (sort of like any critique of Israeli government policy is attacked as anti-Semitic).

2. The voting machine industry has always been in the hands of extreme right-wingers, and in spite of attempts to break up the big players, consolidation has narrowed it down to essentially two firms, one of which makes the paper-ballot tabulators that are being foisted off on any town of over 2000 in Maine.

3. Voting machine and tabulator memory cards (housing both the programming and data storage) are considered proprietary and cannot be examined by anyone, and are often poorly guarded. Citizens have no right to get access to ballots that go through opt-scan tabulators into locked boxes, and the candidates who might have a right to examine them seldom do (who wants to be called a "sore loser?"). Both direct recording DRE voting machines and vote tabulators (used at both local and state levels) have been shown to be hackable, often with little effort and using off-the-shelf inexpensive equipment. The most trivial approach is setting the starting "zero" counters for the candidates to +X for one candidate and -X for another, instead of zeroes. This will produce a 2X extra margin for one candidate, while maintaining the correct "vote count." A memory card usually has 500K-700K lines of code, four inconspicuous ones of which can do this -- and a few more can make that only happen on Election Day, so that pre-E-day testing comes out right. And paper-trail receipts can be printed quite differently from what is recorded on the memory card in a DRE machine. In short --

> **The vast majority of votes counted in this country, on both DRE voting machines and opt-scan ballot tabulating machines, are completely opaque and unverifiable.**

4. Given the tremendous power and financial value in control of the government at various levels, and the endless surveys which show people in this country more and more willing to cheat, the question is not "Who would DO such a thing," but rather "Who would NOT do it."

5. The Gallup polling organization was taken over by radical Christian George Gallup III. He instituted the "Likely Voter Cutoff Model," which uses screening questions that eliminate whole

classes of likely Democratic voters. The result was a portrayal of the electorate as more right-wing than they actually are, so when the "red-shift" of electoral theft produced "voting counts" that were to the right of other pollsters (not good PR for pollsters), they fell into line.

6. The same thing happened with exit polling, which is the gold-standard everywhere in the world -- except in the United States, where the results are now always "adjusted" to the right to match the "vote count" so their results can be used for (misleading) demographic analysis. Simon has documented this by grabbing the initial exit poll results and then watching them change. It should be noted this doesn't happen with most state legislative and U.S. House races, but only because exit polling is seldom done on those, leaving them as the low-hanging -- and extremely valuable, given the potential for gerrymandered redistricting -- fruit for election thieves.

7. So now polling not only portrays the electorate as conservative, but also gives cover to the "red shift" vote theft. Simon sites a striking example of the blindness of the Dems: he asked the head of polling for the DNC about their results. The pollster said it was odd how their internal polling -- always the most accurate, of necessity -- was always off. They got to assuming that a 10% lead meant an even heat. And he refused to consider theft as an explanation, though he had no better one.

8. The 2010 election was crucial in paving the way for gerrymandered redistricting, creating almost 100% Dem mostly-urban districts and a lot of widespread mixed districts that were either mostly Rep, or close to 50-50 -- close races being always the easiest to steal without detection. And as an off-year election, it was not so closely watched.

9. Simon produces massive statistical evidence supporting the claim of red-shift theft. He cites wonderful examples of carelessness on the part of thieves, like a South Carolina Dem primary, where a nobody who made no campaign appearances and had an anonymous person put up the entry fee won with 59% of the vote over a very popular opponent. He lost in the general election, of course; when he later ran for the legislature, he got about 30 votes.

> *It's also of local interest that the same sudden 7% margin that Wisconsin governor Scott Walker got in both his recall and reelection campaigns (where he was slated in both to lose) is the same margin that suddenly showed up for Paul LePage after being tied to the last minute with Mike Michaud.*

10. ALL commentators, in both the mainstream* and alternative medias and the Democratic Party, focus on polls and overt Republican disenfranchisement efforts. Which is just fine with the people doing the efficient big-time theft, since, as with a magician, everyone's attention is elsewhere than where the action is.

11. Now that Republicans control most of the statehouses and state legislatures and both houses of Congress, with a gerrymandered guarantee of control and changes in the Electoral College method, it is not likely that Dems will see control of any of these, or of the Presidency, at any time in the foreseeable future, absent any incredibly major wide-spread scandal or "October surprises" that occur after the practical deadline for putting fixes in place in all key places.

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* For an exception, see Harper's November 2012 article "How To Rig An Election" at http://dickatlee.com/issues/elections/evote/pdfs/harpers_election_theft.pdf

How Do You Steal An Election on a Optical Scanner?

* Jonathan Simon commentary on this: https://www.youtube.com/watch?v=UBDWCYxeHVo
* Stephen Spoonamore commentary starts: https://www.youtube.com/watch?v=ZAyEfovA404
* concise 7-minute Spoonamore discussion of theft and random audit: http://dickatlee.com/issues/elections/evote/maine_rcv/spoonamore_velv_revol_2006.mp3

1. **Memory Card I** -- The theft is handled by the memory card, which has thousands of lines of executable code for handling the ballots, the log files of what is occurring, and the counting registers for the various candidates and issues. Memory cards can be mass duplicated.
2. **Unbalanced Start** -- At the beginning of the election (or test) the code is supposed to set the counting registers to zero for each candidate or issue. You include in the code (or in a convenient update) a few lines of code that start the desired winner at some positive number (say, 100), and lines of code that will set the other candidates/issues to some combination of negative numbers whose sum equals that positive number (-100).
3. **CYA** --
    a. **Testphobia** -- Just in case someone might run a test, you pull a Volkswagen switch, with code that checks the date/time and only executes the above code if the date/time indicates the election is on. The machine will behave normally for a test at any other time.
    b. **Now you see it...** -- Just in case someone might look at the code after the election, you design the code to be self-deleting after the election.
4. **The Steal** -- "Zero" the counting register for Candidate A at -100 votes, and the register for Candidate B (the desired winner) at +100 votes. Let's say there are 900 voters in the election, and they give Candidate A (the legitimate winner) 500 votes and Candidate B 400 votes. But the machine "results" of the election are different: Candidate A gets 400 (500-100), Candidate B wins with 500 (400+100). The total (900) matches the recorded number of voters (nothing to see here, folks, keep on moving...), and the spread is a comfortably large at 11% (56% to 45%) so there won't be a recount. Hence the ballots will never be checked and the theft not detected.
5. **Memory Card II** -- No one will ever check the memory cards, so CYA step 3b may not be necessary.
6. **Decapitation** -- It may not be necessary to mess with the individual memory cards at all if you can hack the central state tabulator, which Maine will purchase if Ranked Choice Voting is implemented.
7. **Prevention?** -- Computer security expert Stephen Spoonamore says a random hand count of 1-2% of scanned ballots would be enough to spot fraud. But will it ever be done in Maine? And is it even possible with Ranked Choice Voting?

Democratic Denial of Election Theft, and Its Erroneous Rationales

In his book, *Code Red: Computerized Election Theft In the New American Century (post 2014 edition)*, Dr. Jonathan Simon points out and debunks the rationalizations (see below) used to explain "Red Shift" discrepancies:

a. votecounts that don't match exit polls, and
b. Republican candidate sweeps or narrower-than-expected losses accompanied by wide-margin victories of liberal ballot measures

But in the end, he says, it is not a matter of logic and reason (p.35):

> Finally, there is religion. I don't mean here belief in a deity but rather a secular religion of equal intensity. To illustrate I'd like to recount an experience I had at a national conference on media reform in 2007. At a panel session I publicly asked Cornell Belcher, chief pollster for the Democratic National Committee, a question about poll-votecount disparities and the red shift. Having stated flat out that the red shift cold not be attributable to any problem with vote counting (ie., election theft), he then added this curious observation, which I give from memory: "You know, it's odd but we have the same problem with our own internal polling: in important races, when our polls show our guy [the Democratic candidate] up by 10%, we've learned that we need to regard the race as a dead-heat toss-up."
>
> Well. What exactly are we to make of *that*? Internal polls are designed not for political salesmanship but for *maximum accuracy*; they inform the party where support is needed, not needed, or likely to be wasted -- where vital campaign dollars should and should not be spent. When such internal polls are consistently "off" in the neighborhood of 10%, all sorts of alarm bells should be ringing and ringing loud. It takes a religious belief in the sanctity of an entirely unseen process, and everything we so desperately want that process to stand for, to ignore those bells -- to not even hear them. After I pointed this out, Cornell Belcher then restated flat out that the 10% disparity between his internal polls and election outcomes could not possibly be caused by election rigging. It felt like something out of *Inherit The Wind*, or perhaps Elmer *Gantry*: "Brothers! Sisters! Do ye *believe*?!"

Simon analyses and disposes of these rationales (p. 113ff, looking at the 2014 "rout"):

1. **Low Turnout** -- There is no reliable direct measure of who shows up, simply the assertion "Dems lost because Dems are fringe voters and don't show up." Then why the exit poll and initiative/candidate discrepancies?
2. **Voter Suppression** -- Exit polls measure the voters who actually show up, not those who are disenfranchised by suppression.
3. **Dark Money** -- Analyses of 2014 financing show a Rep advantage of only 3%, and major $$ advantages did not correlate with victory in many key races (i.e., law of diminishing returns).
4. **Gerrymandering** -- It has no effect on Senatorial and Gubernatorial elections, which were rife with red shift, and can't explain the exit-poll/vote-count and initiatives discrepancies.
5. **Skewed polls** -- i.e., "Dems lose because pollsters oversample Dems who then don't show up" -- circular reasoning based on an *assumption* of votecount accuracy. So polls are now being designed to "better match" votecounts by (a) using the "Likely Voter Cutoff Model" for selecting the sample, disproportionately eliminating Dems (p. 250ff), and (b) adjusting exit polls to match votecounts after the fact (i.e., assuming the polls are wrong) and then using the resulting "demographics" to weight the next election's sample.

Does Ranked Choice Voting Imply A Loss of Election Certainty?

Dick Atlee, 20 January 2016

http://dickatlee.com/issues/elections/evote/maine_rcv/rcv_and_machine_counting.html

Ranked Choice Voting (RCV) is an appealing way to address to significant problems with a plurality-victory election system in the case of races involving more than two candidates or issues:

a. It eliminates the discontent associated with a victory obtained by less than a majority.
b. It allows people to vote for whom they really want, eliminating the "spoiler" effect.
c. It provides an incentive for candidates to reach beyond their often-extreme base of support, reducing the likelihood of incivility in campaigns.

This is accomplished by enabling voters to rank (1,2,3...) the candidates or ballot issues. The process then becomes one of checking which candidate got the least number of #1 choices, eliminating him/her and distributing his/her #2 choices as #1 choices among the remaining candidates, and repeating the process as necessary until one candidate has a majority of #1 votes.

However, because of the link between RCV and (non-transparent) electronic vote handling, the question arises: **does accepting the advantages of RCV, which are short-term, applying to a single election, mean the sacrifice of any certainty in the integrity of the election?**

The unbreakable link between RCV and electronic vote handling

The "Precinct" Level -- At this first limited level, if one wished to do the election (or an audit) by hand count, the procedure would be straightforward:

a. sort the ballots into first-choice piles,
b. check for majority, and if not reached,
c. take the smallest pile and redistribute it according to second choice,
d. repeat b and c until one pile has a majority is reached.

This could also be done by sorting the ballots into all the different permutations of rankings -- e.g., for 3 candidates, the ranking possibilities are 123, 132, 213, 231, 312, 321 -- and analyzing those.

"Exponentially" increasing complexity -- This becomes less and less practical as the number of candidates/issues and/or ballots increases. In Maine where elections tend to involve about 700,000 ballots, it would be impossible to do it at the state level, even if all ballots were gathered in Augusta. So machine tabulation is ultimately necessary, both to handle the ballots from jurisdictions without optical scanners, and to compute the final RCV results.

So what's the problem?

There have been many proofs of the hackability of electronic election systems, both touch-screens and optical scan systems. But more important, there is voluminous evidence, both in individual cases and a larger statistical picture, of manipulation of elections in which votes are

handled electronically, going back to the early days of electronic voting. This is discussed elsewhere (a good start is Prof. Jonathan Simon's book, ***Code Red: Computerized Election Theft and the New American Century***. Those who deride such an idea as "conspiracy theory" have not looked at the evidence.

What can be done about it?

Auditing -- The existing solution for checking on electronically-assisted elections is random checking of some percentage of the election. This should be done by comparing hand-count results with machine results, but this is only possible with optical scanners, and some jurisdictions only require a re-run of the ballots through the same potentially compromised machine.

Randomness -- Computer security expert Stephen Spoonamore states that there is an inherent "background noise" of fraud in credit-card processing of roughly 2.5%. He states flatly that paper ballots are essential for preventing fraud in elections, and that if they are counted by optical scanners, a comparison of the machine results with a hand count of a 1-2% random sample of the paper ballots would be necessary (though perhaps not sufficient) to indicate the absence of fraud. Other election integrity advocates say this estimate is far too low. Still others say this is an academic dream, that the fact on the ground is that "randomness" can be -- and is -- seriously manipulated to hide fraud, and that even if it weren't, procedures would need to be in place to guarantee there was no advance notice to permit manipulation in the "random" jurisdictions.

In any case, while this works straightforwardly in a commonplace "plurality voting" election, its application in RCV, where *all* votes are involved in the final result, it is a lot less straightforward -- though it can be done[1].

Parallel re-run -- Another approach[2], TEVS (Transparent Election Validation System), developed in Humboldt County, CA, seems to hold more promise. In this, at the end of the voting, each precinct runs the ballots through a separate off-the-shelf scanner using TEVS, and then sends these ballot images to independent organizations that use TEVS to generate data and move it into a spreadsheet, which is public and can be checked by anyone. For RCV, the spreadsheet can be sorted into permutations and the results determined manually. This would seem to hold the most promise for election integrity, both now *and* under RCV.

Conclusion

In the end, we return to the fundamental trade-off question at the base of this inquiry -- is the comfort of short term improvements in single elections worth the loss of any guarantee of electoral integrity? RCV's machine dependence renders this loss inevitable in the absence of some auditing method -- those described here or some other effective method. And there is no such method included in Maine's RCV initiative. Not only that, but there is no such effective method in place in the system we have today in Maine.

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1. See http://dickatlee.com/issues/elections/evote/maine_rcv/rcv_auditing_possibilities.html#1
2. See http://dickatlee.com/issues/elections/evote/maine_rcv/rcv_auditing_possibilities.html#2

Is Auditing an RCV Election Possible?

Dick Atlee, 19 January 2016

On the surface, a hand-count audit of a random sample of a large (e.g., Maine's 700K ballots) Ranked Choice Voting (RCV) election seems conceptually impossible, since the result is dependent on taking all ballots into account. The question is, is there some less direct yet feasible and dependable approach that could accomplish the same goal.

Here are two possibilities (there may be more):

1. One, devised by me in consultation with an RCV proponent, involves comparing a hand count of random local jurisdictions with both the original results from those jurisdictions and the results from reruns on the machines that originally tabulated them (to deter "Volkswagen" test trickery).
2. The other, based on work done by software developer Mitch Trachtenberg in Humboldt County, CA, involves no randomness, but rather machines and handwork -- the independent re-scanning of ballots and their conversion to public spreadsheet data for transparent "hand" calculation of the results.

I'll outline both here. However, it is important to keep in mind that neither procedure will be in effect if/when RCV is passed in November. And unfortunately, the changes in laws, rules, procedures and equipment required to bring these about are not the kind of gut-level no-brainer issue that has brought RCV so far. Thus, they seem far less likely to ever be implemented, particularly in an environment of the denial of the existence of election theft. ***Without them -- or some equivalent audit method -- RCV leaves us with impossible-to-verify elections.***

Both approaches need to be viewed in the Maine environment of about 500 municipalities, in which half tabulate 80% of the vote on optical scanners, and half (smaller communities) hand-count 20% of the vote.

Audit Method #1: Random Subsets With an Open Source RCV Algorithm

I've heard various estimates of what percentage of the vote from randomly selected sites is necessary to effectively detect election theft -- from 1-2% to 5% and up. I've also heard from on-the-ground people that such percentages are the creations of academics who have no grasp of a hard reality -- i.e., that "random" can be and is defined and interpreted to suit particular interests, and thus is not a useful auditing concept. However, this first auditing method assumes that some percentage and randomization scheme can be determined that works and is practically implementable. To the extent that randomization is not trustworthy, Audit Method #2 would be preferable.

1. RCV election summary:
   a. Scanner memory cards are sent to a central location
   b. Hand-count ballots are sent to be scanned either to this location or regional centers.
   c. Final results are produced by an algorithm. The requirements for this to be auditable are:

    1. The software that implements the algorithm must be open source, AND
    2. The totals for each of the rank-order permutations must be available in publicly accessible records
3. The first part of the audit is a **scanner integrity check**
    a. The scanners to be checked are:
        1. A random selection of scanner jurisdictions, AND
        2. The central scanner for hand-count jurisdictions, using ballots from a random but discrete set of jurisdictions -- or, if regional scanning is done, then each regional scanner scans ballots from a random set of jurisdictions within that region.
    b. Method used (will also detect the "Volkswagen" test-vs-vote hack):
        1. Rerun the ballots from that jurisdiction through the scanner
        2. Hand count those ballots
        3. Compare these two results with the actual election results from that scanner
4. The second part is an **algorithm integrity check**
    a. Use the ballots used in the scanner-integrity checks (they're now a known quantity)
    b. Run them through the algorithm
    c. Hand "count" them to get the permutations
    d. Manually run these through the RCV process
    e. Compare the manual- and algorithm-produced results.
5. If the both the scanner and the algorithm integrity tests check out, there is a high probability that the election was not tampered with.

Standard caveat: If all of these procedures are not implemented in law and rules, there would be no effective protection against sophisticated election theft.

Audit Method #2: Independent Same-Day Re-Scan/Tabulation

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 voting and RCV algorithm results. This would appear to be more simple and straightforward than Audit Method #1. It goes like this:

1. Each polling place (and the central or regional scanning locations) that is using a DS200 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 the 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 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 an 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. It solves the entire election integrity problem, regardless of whether RCV is passed or not. However, it has a number of pre-requisites:

1. Adapting the TEVS software (the source code is free, it currently runs under Linux) -- an easy project for a college computer science class.
2. Procurement of inexpensive scanners -- chicken-feed in terms of bang-for-buck, though money will 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 s scanner needs to be included in that site's TEVS implementation.]
3. Ballots must have serial numbers, which is also a protection against substitution of photo-copied ballots.
4. The 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?"]
5. The 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. RCV's proposal is doing just that, but it has a tidal wave of signatures and the coming vote riding behind it. Would RCV people also push for these minor changes? If they wouldn't, they've guaranteed non-transparent elections into the future.

Maine's Vote Tabulation Situation

with some context relating to Ranked Choice Voting (RCV)

Dick Atlee, 18 January 2016

(http://dickatlee.com/issues/elections/evote/maine_rcv/pdfs/maine_vote_tabn_details.pdf)

[This summary is derived from conversations and double-checking with staff from the Elections Division of the Maine Bureau of Corporations, Elections, and Commissions. However, all comments, implications and conclusions are mine.]

CURRENT STATE EQUIPMENT SITUATION

- In 2012 Maine contracted with ES&S (Election Systems and Software) to lease machines and ballot layout software until 2019, after which the contract will go out to bid.
- Municipalities don't have to pay for equipment necessary to support state elections unless they have fewer than 1000 registered voters.
- A municipality pays only if it needs more machines -- e.g. they are running local elections at the same time as state/federal elections, and want a second tabulator to handle the additional ballots (i.e., a second ballot is similar to doubling the number of voters)
- HAVA funds paid for the beginning, but will be depleted by the end of 2016.
- Equipment distributed last November was the last hardware addition the state could obtain under its current contract with ES&S, which expires on 12/31/2019
- There used to be several types of scanners around the state, but many were old and discontinued, and the state wanted consistency, so these were replaced with DS200's.
- About 260 out of 500 municipalities have them -- 125 were using older ones from before the ES&S contract; the others were former hand-count municipalities.

CURRENT STATE BALLOT SITUATION

- In recent elections there have tended to be 100K hand-count ballots, 600K tabulated ballots.
- Currently there are about 350 different ballot styles in the state.
- Hand-counted ballots are produced more cheaply -- they don't need all the control markings.

SECURITY

- State police handle the town-to-state transfer of hand-counted ballots and memory sticks.
- In recounts, ballots are sent to the state, recounted there, and then returned to the towns.
- Ballots stay at the town for 22 months (the length of time it would take for a Federal elections case to come up).
- The Secretary of State's office has had enough recounts to feel confident of the technology.

> ***It should be noted, however, that an effective hacking attack would***
> ***(a) guarantee vote spreads outside the recount trigger, and***
> ***(b) have the ability to determine whether voting is being done on Election Day or for a pre-election test or post-election recount (i.e., the Volkswagen scandal).***

RANKED CHOICE VOTING ISSUES

The main conclusion related to all the following points is that for a variety of reasons RCV would preclude any possible return to hand counting.

- A demonstration of RCV done by RCVMaine in a Bar Harbor restaurant, involving a 4-way vote for favorite hors d'oeuvres and sorting people into corners of the room, was elegant in illustrating the process, but by simulating a single municipality with about 40 voters, it failed to illustrate the greatly increased complexity of 700K voters in 500 municipalities.
- In simple-choice "plurality" voting, only the town totals need to be sent to the state. However, RCV's mechanism of loser elimination and next-choice redistribution can't occur until all electronic *cast-vote records* (CVRs) are aggregated at the state level. As currently envisioned, this would involve sending **ballots** from hand-count municipalities to Augusta (or regional centers) to be scanned, and **memory sticks** from the others, adding an additional level of required electronic tabulation, and a requirement for expensive DS200 ballots in hand-count towns.
- Because of the large number of ballots, and the complexity of counting (not just sorting ballots into different piles based on simple-choice votes), hand counting of RCV ballots at the state level would be a practical impossibility.
- Recounts of statewide RCV elections would thus obviously also have to be done by tabulator, and would necessitate a change in the current state rule requiring that recounts be hand-counted.
- The state likely will use separate ballots for non-RCV and RCV races, so that recounts for non-RCV can proceed separately from the RCV additional rounds of counting or possible RCV recounts.
- In RCV elections, towns would still have access to who won by plurality in their town, since first-choice counts would be analogous to simple-choice voting.
- ES&S has higher-speed models, one or more of which would be necessary in RCV for state-level tabulation of ~100K ballots from towns not using tabulators.
- ES&S has a new version of software that can handle ballots (not the actual vote counting) w/RCV layout; this would require purchasing an upgrade.
- To handle the counting, a new algorithm would be required. ES&S custom writes these for each customer, given that rules for what counts vary over jurisdictions. Or it could be purchased from a third party (which might permit open-source code).
- The algorithm can put the cast-vote records into a spreadsheet, which can be publicly and transparently analyzed. This was done in Minneapolis and St. Paul in 2013: *https://www.minnpost.com/politics-policy/2013/11/still-confused-faq-ranked-choice-voting* with 50K ballots, but would be prohibitive in our 700K-ballot situation.
- Constitutional issues that might interfere with RCV (this is controversial):
  - Town level results must be reported to the Secretary of State;
  - Plurality defines gubernatorial victory; the same is indirectly true for House and Senate.
  - The legislature must be seated by the 1st Wednesday in December, another reason why hand counts of RCV might occasionally be problematic.
- To the extent that there would be much work and expense (including voter education) involved in a transition to RCV, the potential for a successful court challenge against it raises understandable concerns.
- Proof of concept test -- In 2015, Portland took 100 ballots from their 2011 15-candidate mayoral race and set things up so that 12 rounds would be required. They ran it with DS200s and with hand count. The results were the same, though in general that is not inherent "proof" in light of the possibility of a "Volkswagen" test-thwarting hack. The hand count of 100 ballots took 2.5 hours, indicating the practical impossibility of hand counts

expanded from 100 to Portland's 30K or Maine's 700K.

Without an ability to effectively audit machine-counted election results, there is no guarantee of protection from computerized election theft. Of two possible audit mechanisms (see Audit page), neither is currently in effect -- nor will be after November -- or is even possible under current state law. So adopting RCV comes down to a significant choice:

some desirable election improvements vs. the future ability to trust our elections

Maine Municipalities: Method of Voting

(from a Division of Elections spreadsheet; an estimated 500 municipalities receive ballots)

DS200 Scanner (258)

(8 municipalities use multiple scanners, 2 (bold) share one, for a total of 270)

AND	AUBURN
AND	DURHAM
AND	GREENE
AND	LEEDS
AND	LEWISTON
AND	LISBON
AND	LIVERMORE
AND	LIVERMORE FALLS
AND	MECHANIC FALLS
AND	MINOT
AND	POLAND
AND	SABATTUS
AND	TURNER
AND	WALES
ARO	**CARIBOU (& Connor Twp)**
ARO	EAGLE LAKE (in 2016)
ARO	EASTON
ARO	FORT FAIRFIELD
ARO	FORT KENT
ARO	HOULTON
ARO	LIMESTONE
ARO	MADAWASKA
ARO	MAPLETON
ARO	MARS HILL
ARO	PRESQUE ISLE
ARO	SHERMAN
ARO	VAN BUREN
ARO	WOODLAND
CUM	BALDWIN
CUM	BRIDGTON
CUM	BRUNSWICK
CUM	CAPE ELIZABETH
CUM	CASCO
CUM	CHEBEAGUE ISLAND
CUM	CUMBERLAND
CUM	FALMOUTH
CUM	FREEPORT
CUM	GORHAM
CUM	GRAY
CUM	HARPSWELL
CUM	HARRISON
CUM	NAPLES
CUM	NEW GLOUCESTER
CUM	NORTH YARMOUTH
CUM	PORTLAND
CUM	POWNAL
CUM	RAYMOND
CUM	SCARBOROUGH
CUM	SEBAGO
CUM	SOUTH PORTLAND
CUM	STANDISH
CUM	WESTBROOK
CUM	WINDHAM
CUM	YARMOUTH
FRA	FARMINGTON
FRA	JAY
FRA	KINGFIELD
FRA	NEW SHARON
FRA	RANGELEY
FRA	STRONG
FRA	WILTON
HAN	BAR HARBOR
HAN	BLUE HILL
HAN	BUCKSPORT
HAN	CASTINE
HAN	DEDHAM
HAN	DEER ISLE
HAN	ELLSWORTH
HAN	FRANKLIN
HAN	GOULDSBORO
HAN	HANCOCK
HAN	LAMOINE
HAN	MOUNT DESERT
HAN	ORLAND
HAN	PENOBSCOT
HAN	SOUTHWEST HARBOR
HAN	STONINGTON
HAN	SULLIVAN
HAN	SURRY
HAN	TREMONT
HAN	TRENTON
KEN	**ALBION/UNITY TWP.**
KEN	AUGUSTA
KEN	BELGRADE
KEN	BENTON
KEN	CHELSEA
KEN	CHINA
KEN	CLINTON
KEN	FARMINGDALE
KEN	FAYETTE
KEN	GARDINER
KEN	HALLOWELL
KEN	LITCHFIELD
KEN	MANCHESTER
KEN	MONMOUTH
KEN	MOUNT VERNON
KEN	OAKLAND
KEN	PITTSTON
KEN	RANDOLPH
KEN	READFIELD
KEN	SIDNEY
KEN	VASSALBORO
KEN	WATERVILLE
KEN	WAYNE
KEN	WEST GARDINER
KEN	WINDSOR
KEN	WINSLOW
KEN	WINTHROP
KNO	APPLETON
KNO	CAMDEN
KNO	CUSHING
KNO	HOPE
KNO	OWLS HEAD
KNO	ROCKLAND
KNO	ROCKPORT
KNO	SOUTH THOMASTON
KNO	ST. GEORGE
KNO	THOMASTON
KNO	UNION
KNO	WARREN
KNO	WASHINGTON
LIN	BOOTHBAY
LIN	BOOTHBAY HARBOR
LIN	BRISTOL
LIN	DAMARISCOTTA
LIN	DRESDEN
LIN	JEFFERSON
LIN	NEWCASTLE
LIN	NOBLEBORO
LIN	SOUTH BRISTOL
LIN	SOUTHPORT
LIN	WALDOBORO
LIN	WHITEFIELD
LIN	WISCASSET
OXF	BETHEL
OXF	BROWNFIELD
OXF	BUCKFIELD
OXF	DENMARK
OXF	DIXFIELD
OXF	FRYEBURG
OXF	GILEAD
OXF	GREENWOOD
OXF	HIRAM
OXF	MEXICO
OXF	NORWAY
OXF	OTISFIELD
OXF	OXFORD
OXF	PARIS
OXF	PERU
OXF	PORTER
OXF	RUMFORD
OXF	SUMNER
OXF	WATERFORD
OXF	WEST PARIS
OXF	WOODSTOCK
PEN	BANGOR
PEN	BRADLEY
PEN	BREWER
PEN	CARMEL
PEN	CHARLESTON

PEN CORINNA
PEN CORINTH
PEN DEXTER
PEN EAST MILLINOCKET
PEN EDDINGTON
PEN ENFIELD
PEN ETNA
PEN GLENBURN
PEN HAMPDEN
PEN HERMON
PEN HOLDEN
PEN HOWLAND
PEN HUDSON
PEN KENDUSKEAG
PEN LAGRANGE
PEN LEE
PEN LEVANT
PEN LINCOLN
PEN MEDWAY
PEN MILFORD
PEN MILLINOCKET
PEN NEWBURGH
PEN NEWPORT
PEN OLD TOWN
PEN ORONO
PEN ORRINGTON
PEN PATTEN
PEN PLYMOUTH
PEN VEAZIE
PIS DOVER-FOXCROFT
PIS GREENVILLE
PIS MILO
SAG BATH
SAG BOWDOIN
SAG BOWDOINHAM
SAG PHIPPSBURG
SAG RICHMOND
SAG TOPSHAM
SAG WEST BATH
SAG WOOLWICH
SOM ANSON
SOM CANAAN
SOM FAIRFIELD
SOM HARTLAND
SOM MADISON
SOM MOSCOW
SOM NORRIDGEWOCK
SOM PALMYRA
SOM PITTSFIELD
SOM SKOWHEGAN
SOM ST. ALBANS
WAL BELFAST
WAL BROOKS
WAL ISLESBORO
WAL LINCOLNVILLE
WAL MONROE
WAL NORTHPORT
WAL PALERMO
WAL SEARSMONT
WAL SEARSPORT
WAL STOCKTON SPRINGS
WAL SWANVILLE
WAL UNITY
WAS ADDISON
WAS BAILEYVILLE
WAS CALAIS
WAS EASTPORT
WAS LUBEC
WAS MACHIAS
YOR ACTON
YOR ALFRED
YOR ARUNDEL
YOR BERWICK
YOR BIDDEFORD
YOR BUXTON
YOR CORNISH
YOR DAYTON
YOR ELIOT
YOR HOLLIS
YOR KENNEBUNK
YOR KENNEBUNKPORT
YOR KITTERY
YOR LEBANON
YOR LIMERICK
YOR LIMINGTON
YOR LYMAN
YOR NEWFIELD
YOR NORTH BERWICK
YOR OGUNQUIT
YOR OLD ORCHARD BEACH
YOR PARSONSFIELD
YOR SACO
YOR SANFORD
YOR SHAPLEIGH
YOR SOUTH BERWICK
YOR WATERBORO
YOR WELLS
YOR YORK

Hand Count (232)

(The multiple municipalities shown in bold share a scanner, for a total of 221)

ARO ALLAGASH
ARO AMITY
ARO ASHLAND
ARO BLAINE
ARO BRIDGEWATER
ARO CARY PLT
ARO CASTLE HILL
ARO CASWELL
ARO CHAPMAN
ARO CRYSTAL
ARO CYR PLT
ARO DYER BROOK
ARO FRENCHVILLE
ARO GARFIELD PLT
ARO GLENWOOD PLT
ARO GRAND ISLE
ARO HAMLIN
ARO HAMMOND
ARO HAYNESVILLE
ARO HERSEY
ARO HODGDON
ARO ISLAND FALLS
ARO LINNEUS
ARO LITTLETON
ARO LUDLOW
ARO MACWAHOC PLT
ARO MASARDIS
ARO MERRILL
ARO MONTICELLO
ARO MORO PLT
ARO NEW CANADA/CROSS LAKE TWP
ARO NEW LIMERICK
ARO NEW SWEDEN
ARO OAKFIELD
ARO ORIENT
ARO OXBOW PLT
ARO PERHAM
ARO PORTAGE LAKE/NASHVILLE PLT
ARO REED PLT
ARO SAINT AGATHA/SINCLAIR TWP
ARO SAINT FRANCIS
ARO SAINT JOHN PLT
ARO SMYRNA
ARO STOCKHOLM/MADAWASKA LAKE TWP
ARO WADE
ARO WALLAGRASS
ARO WASHBURN
ARO WESTFIELD
ARO WESTMANLAND
ARO WESTON
ARO WINTERVILLE PLT
CUM FRYE ISLAND
CUM LONG ISLAND
FRA AVON
FRA CARRABASSETT VALLEY
FRA CARTHAGE
FRA CHESTERVILLE
FRA COPLIN PLT
FRA DALLAS PLT
FRA EUSTIS
FRA INDUSTRY
FRA NEW VINEYARD
FRA PHILLIPS
FRA RANGELEY PLT
FRA SANDY RIVER PLT
FRA TEMPLE
FRA WELD
HAN AMHERST

HAN	AURORA
HAN	BROOKLIN
HAN	BROOKSVILLE
HAN	CRANBERRY ISLES
HAN	EASTBROOK
HAN	FRENCHBORO
HAN	GREAT POND
HAN	MARIAVILLE
HAN	OSBORN
HAN	OTIS
HAN	SEDGWICK
HAN	SORRENTO
HAN	SWANS ISLAND
HAN	VERONA ISLAND
HAN	WALTHAM
HAN	WINTER HARBOR
KEN	ROME
KEN	VIENNA
KNO	FRIENDSHIP
KNO	ISLE AU HAUT
KNO	MATINICUS ISLE PLT
KNO	NORTH HAVEN
KNO	VINALHAVEN
LIN	ALNA
LIN	BREMEN
LIN	EDGECOMB
LIN	MONHEGAN ISLAND PLT
LIN	SOMERVILLE
LIN	WESTPORT ISLAND
OXF	ALBANY TWP
OXF	ANDOVER
OXF	BYRON
OXF	CANTON
OXF	HANOVER
OXF	HARTFORD
OXF	HEBRON
OXF	LINCOLN PLT
OXF	LOVELL
OXF	MAGALLOWAY PLT
OXF	NEWRY
OXF	ROXBURY
OXF	STONEHAM
OXF	STOW
OXF	SWEDEN
OXF	UPTON
PEN	ALTON
PEN	BRADFORD
PEN	BURLINGTON
PEN	CARROLL PLT
PEN	CHESTER
PEN	CLIFTON
PEN	DIXMONT
PEN	DREW PLT
PEN	EDINBURG
PEN	EXETER
PEN	GARLAND
PEN	GREENBUSH
PEN	LAKEVILLE
PEN	LOWELL
PEN	MATTAWAMKEAG
PEN	MAXFIELD
PEN	MOUNT CHASE
PEN	PASSADUMKEAG
PEN	**PENOBSCOT NATION VOTING DISTRICT**
PEN	SEBOEIS PLT
PEN	SPRINGFIELD
PEN	STACYVILLE
PEN	STETSON
PEN	**WEBSTER PLT/KINGMAN TWP/PRENTISS TWP**
PEN	WINN
PEN	WOODVILLE
PIS	ABBOT
PIS	ATKINSON
PIS	BEAVER COVE
PIS	BOWERBANK
PIS	BROWNVILLE
PIS	**GUILFORD/KINGSBURY PLT.**
PIS	LAKE VIEW PLT
PIS	MEDFORD
PIS	MONSON
PIS	PARKMAN
PIS	SANGERVILLE
PIS	SEBEC
PIS	SHIRLEY
PIS	WELLINGTON
PIS	WILLIMANTIC
SAG	ARROWSIC
SAG	GEORGETOWN
SOM	ATHENS
SOM	BINGHAM
SOM	BRIGHTON PLT
SOM	CAMBRIDGE
SOM	CARATUNK
SOM	CORNVILLE
SOM	DENNISTOWN PLT
SOM	DETROIT
SOM	EMBDEN
SOM	HARMONY
SOM	HIGHLAND PLT
SOM	JACKMAN
SOM	MERCER
SOM	MOOSE RIVER
SOM	NEW PORTLAND
SOM	PLEASANT RIDGE PLT
SOM	RIPLEY
SOM	ROCKWOOD STRIP TWP
SOM	SMITHFIELD
SOM	SOLON
SOM	STARKS
SOM	THE FORKS PLT
SOM	WEST FORKS PLT
WAL	BELMONT
WAL	BURNHAM
WAL	FRANKFORT
WAL	FREEDOM
WAL	JACKSON
WAL	KNOX
WAL	LIBERTY
WAL	MONTVILLE
WAL	MORRILL
WAL	PROSPECT
WAL	THORNDIKE
WAL	TROY
WAL	WALDO
WAL	WINTERPORT
WAS	ALEXANDER
WAS	BARING PLT
WAS	BEALS
WAS	BEDDINGTON
WAS	CHARLOTTE
WAS	CHERRYFIELD
WAS	COLUMBIA
WAS	COLUMBIA FALLS
WAS	COOPER
WAS	CRAWFORD
WAS	CUTLER
WAS	**DANFORTH/BROOKTON TWP**
WAS	DEBLOIS
WAS	**DENNYSVILLE/EDMUNDS TWP**
WAS	EAST MACHIAS
WAS	GRAND LAKE STREAM PLT
WAS	HARRINGTON
WAS	INDIAN TOWNSHIP
WAS	JONESBORO
WAS	JONESPORT
WAS	MACHIASPORT
WAS	MARSHFIELD
WAS	MEDDYBEMPS
WAS	MILBRIDGE
WAS	NORTHFIELD
WAS	PEMBROKE
WAS	PERRY
WAS	PLEASANT POINT VOTING DISTRICT
WAS	**PRINCETON/BIG LAKE TWP**
WAS	ROBBINSTON
WAS	ROQUE BLUFFS
WAS	STEUBEN
WAS	TALMADGE
WAS	**TOPSFIELD/CODYVILLE PLT**
WAS	VANCEBORO
WAS	WAITE
WAS	WESLEY
WAS	WHITING
WAS	WHITNEYVILLE

Why a Town Clerk Would Prefer Electronic Voting over Hand Counts

(from a conversation with our excellent and helpful SWH Town Clerk; see note below)

1. **The method for getting ballot counters**:
   a. People sign up at party caucuses
   b. They are the first ones asked to help
   c. Then recruitment of other likely possibilities kicks in.

2. **State requirements:**
   a. Counting teams consist of 2 people, who must be of different parties.
   b. At least one team must consist of a Dem and a Rep
   c. After that, teams consist of one Dem or Rep and one Green or unenrolled
   d. This complicates recruiting and organizing a counting group.

3. **Hard to find counters** --
   a. Some work
   b. Some go away for early vacations
   c. Young people don't seem interested

4. **Cost** -- $10/hour for each counter

5. **Complicated** --
   a. YES/NO issues are easy -- just sort into two piles
   b. Multiple candidate races get more complicated, especially with more than one race on a ballot
   c. When you have 1000+ ballots with candidate races, it takes a lot of time
   d. The longer it takes, the later it gets.
   e. Mistakes happen late at night, and if they are caught, correcting them takes more time.

6. And we don't have as much trouble in Maine as some of the larger states.

[Dick note: I provide this page as representing an "other side" of the e-voting issue. I have a great deal of sympathy with the problems of Clerks trying to round up and budget for volunteers and manage elections -- particularly when elections get long and hence more complicated. So I can understand their enthusiasm for electronic voting systems. However, looking at the larger picture of our having always previously been done this by paper-plus-handcounts, and the fact that other countries like Canada and the U.K. manage to do it, and that in a very real sense our democracy is at risk, it may be necessary to be hard-nosed about the Clerks' problems as "part of their job." Returning to the old way would provide more incentive to push to educate the public on the importance of participation in democracy beyond simply showing up to vote.]