

A Deeper Look at ESI's Report of the Discrepancy-Ridden Vote Counts In Diebold Touchscreen Voting Machines

In August 2006, Election Science Institute (ESI) released a report entitled, "DRE Analysis of May 2006 Primary; Cuyahoga County, Ohio"¹. Election Science Institute is a non-partisan, non-profit election science organization, which was commissioned by Cuyahoga County to review how the county's new election system performed in the early stages of use.

What ESI found was internally inconsistent, unreliable vote totals on every level.

In the section entitled "Comparing the Count," the data shows severe and prevalent discrepancies between the gubernatorial votes reported on the voter-verified paper audit trail (VVPAT), the votes reported in the VVPAT summaries, and the votes reported in two different electronic records.

ESI's overall "Key Finding," stated on page 2 of the report, is this:

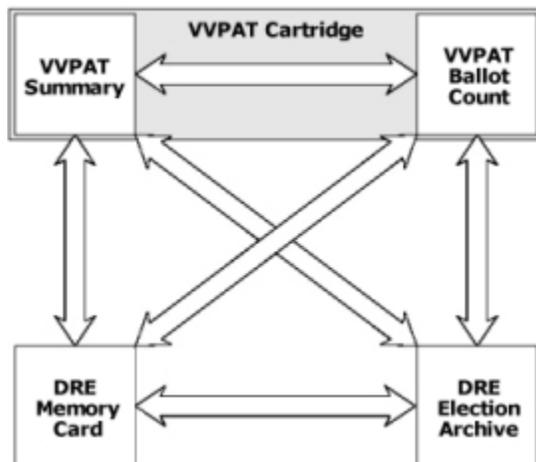
"The machines' four sources of vote totals – VVPAT individual ballots, VVPAT summary, election archive, and memory cards – did not agree with one another."

In a correctly functioning system, all vote totals reported by the system will be identical, regardless of the source of the report – that is, regardless of whether those totals are reported on VVPAT summaries, individual VVPAT ballots, or electronically stored data.

However, ESI's investigation found discrepancies in every pair of vote-data sets they compared. The four types of data used in the comparison were gubernatorial totals reported by:

- ◆ **VVPAT summary** data printed when the VVPAT tape is full or at the end of the day
- ◆ **VVPAT ballots** individually hand counted
- ◆ **DRE memory card** totals, recorded electronically and used to tally the votes
- ◆ **DRE election archive** totals, recorded electronically inside the machine

ESI's chart, shown on page 106 of the report and reproduced below, illustrates the six data-set comparisons they conducted.



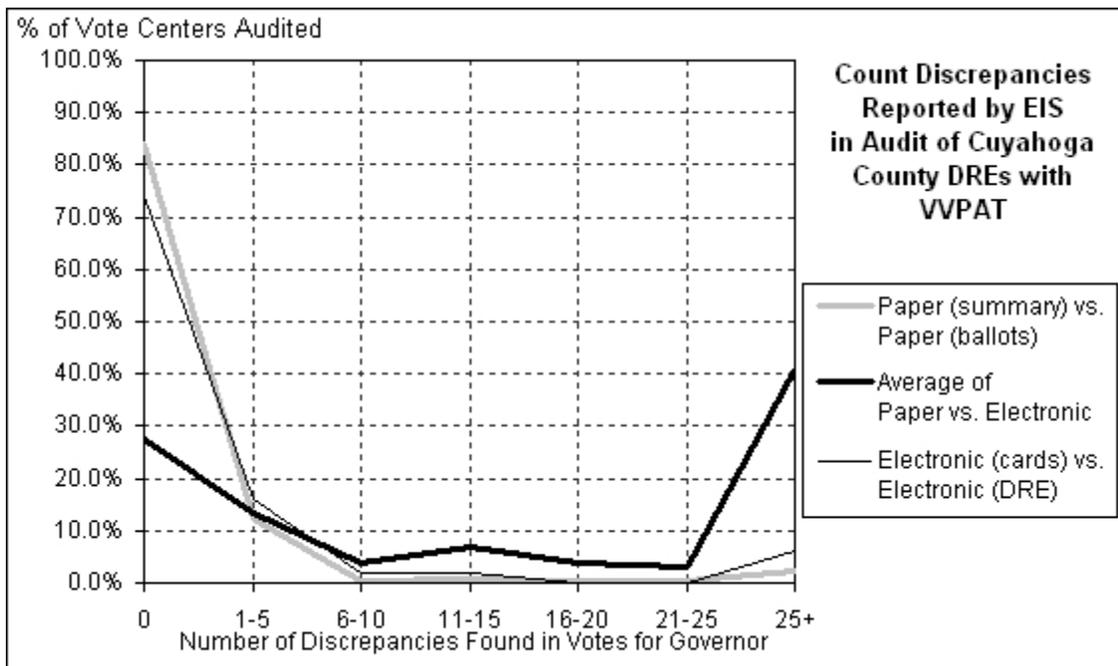
¹ http://www.cuyahogacounty.us/bocc/gsc/pdf/esi_cuyahoga_final.pdf

To recap, they conducted one comparison of paper results to paper results (VVPAT summary to VVPAT ballots); four comparisons of paper results to electronic results; and one comparison of electronic results to electronic results.

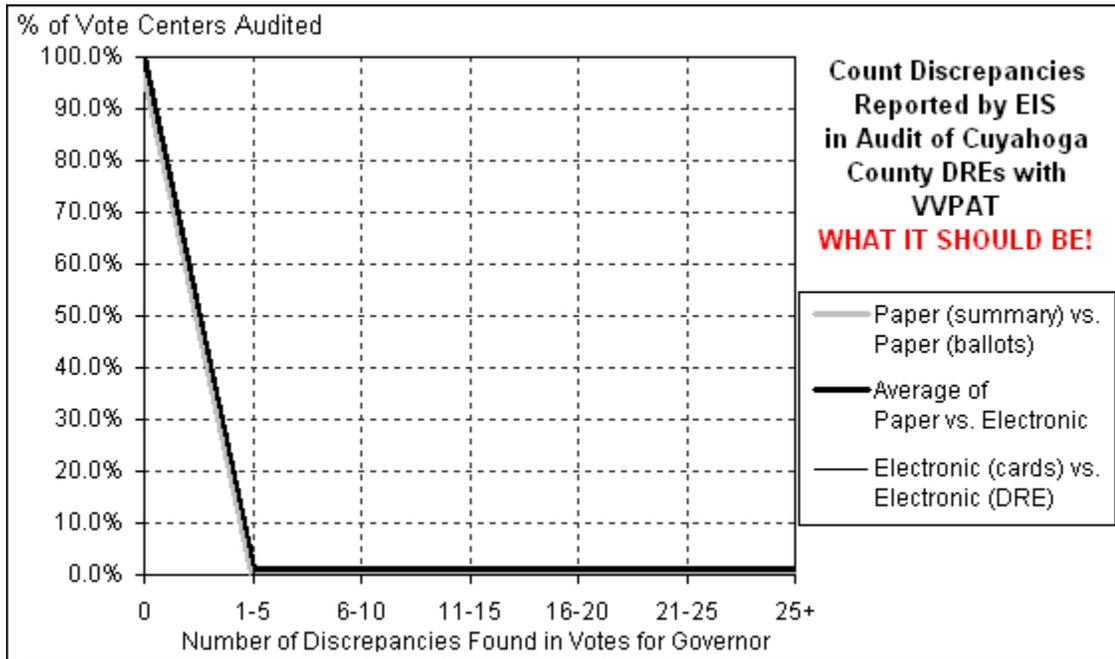
For each of the six comparisons, ESI determined the number of discrepancies found on the DREs in each audited vote center and set up seven arbitrary groupings for the quantities of discrepancies (0, 1-5, 6-10, 11-15, 16-20, 20-25, and 25+). Then they calculated the percentage of audited vote centers with discrepancies that fell into each grouping.

In the chart below, we have summarized the percentage of vote centers that fell into each ESI grouping.

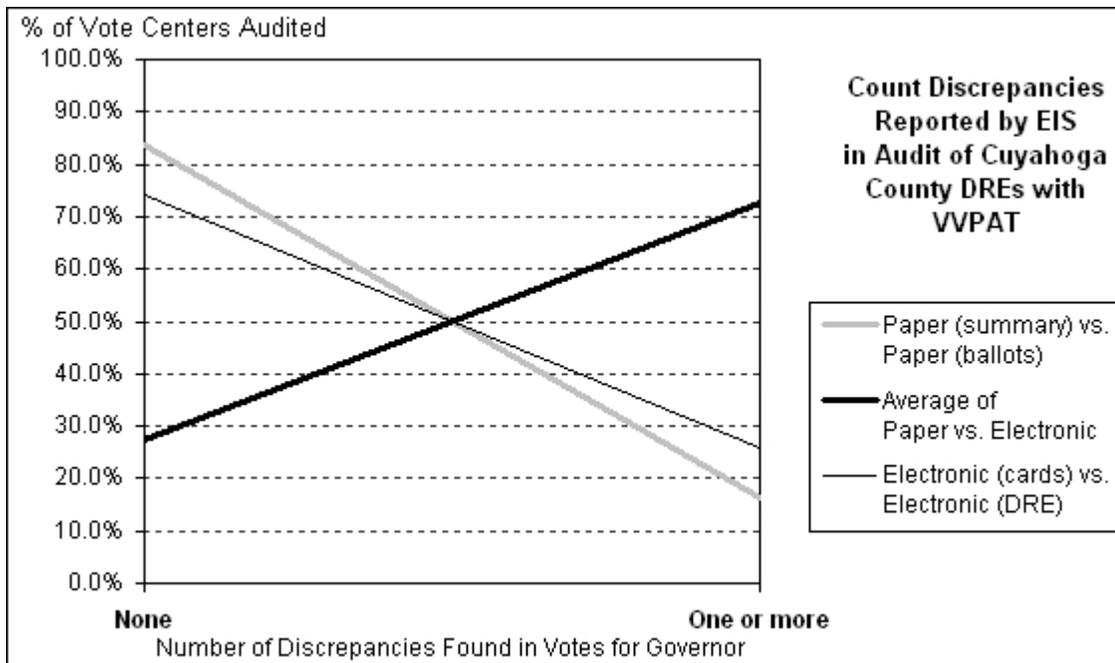
- ◆ The thick gray line shows the percentage of vote centers that fell into each grouping when VVPAT summaries were compared to individual VVPAT ballots. For example, zero discrepancies were found between the VVPAT summaries and the VVPAT ballots in 83.8% of the vote centers.
- ◆ The heavy black line shows the average percentage of vote centers in each grouping when VVPAT data and electronic data were compared. Percentages in each grouping were very similar in all of these four comparisons, so we averaged them for visual simplicity.
- ◆ The thin black line shows the results when the totals recorded inside the DREs were compared to the totals recorded on the DRE memory cards.



Note that in a properly functioning system, there should be NO discrepancies. The chart should look like the one below:



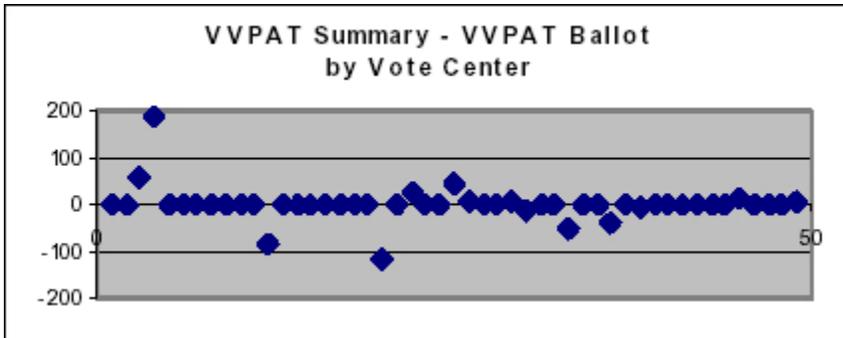
Rather than use the ESI groupings, which show the results over a continuum, the chart below simply shows the percentage of vote centers **without** any discrepancies and the percentage **with** discrepancies.



The data depicted on this chart reveal three very disturbing conclusions:

- 1) **Paper vs. paper.** Discrepancies occurred between the VVPAT summaries and the corresponding VVPAT ballots in **16.2% (over sixteen percent)** of the vote centers audited.

On page 124, the authors state: “On the whole, the VVPAT summaries indicate that more votes were cast than what ESI can account for with the VVPAT ballots themselves.” On page 109 of the report, ESI suggests that these discrepancies occurred because of VVPAT ballots that were torn, blank, or missing.



However, ESI’s scatter-chart on page 111 shows six vote centers in which the VVPAT ballots recorded **more** votes than appeared on the VVPAT summaries – in one vote center over 100 votes more.

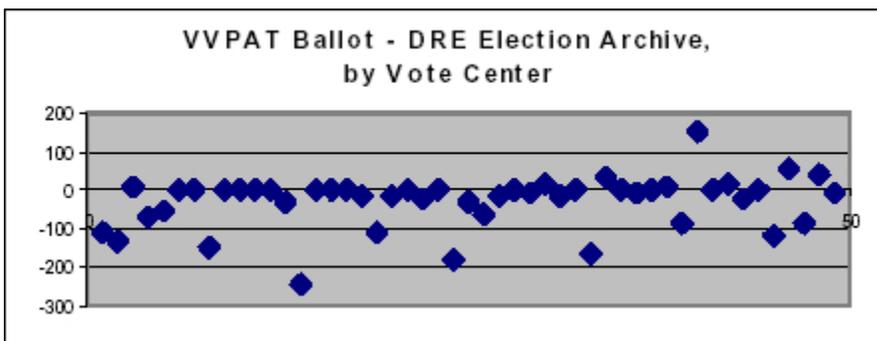
Did the DREs in these five vote centers produce extra VVPAT ballots that didn’t correspond to any voter, or did the summaries fail to include some legitimate votes?

- 2) **Paper vs. electronic.** Discrepancies occurred between the VVPAT totals and the electronic totals **in 72.5% (over seventy-two percent) of the audited vote centers.** The voter-verified paper audit trail didn’t match the electronic totals!

On page 124, the authors state:

“For the most part, the discrepancies can be characterized as the DRE memory cards and Election Archives registering more votes than were produced by the VVPAT summaries or by the hand counts of the VVPAT ballots themselves. Printer issues are likely the cause of some of this shortfall, but it is also the case that ESI may not have located all the paper ballots printed by the machines that were analyzed.”

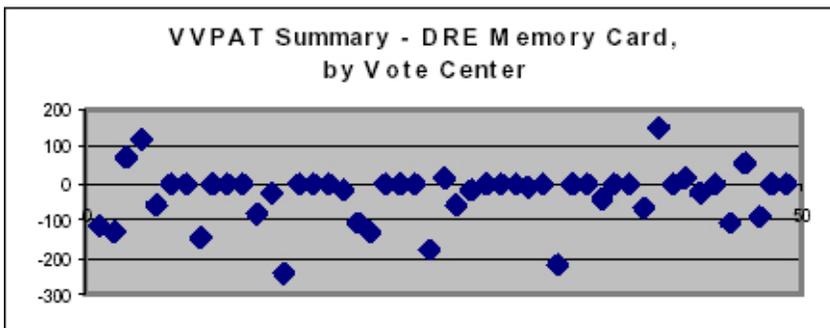
While printer errors and the loss of VVPAT ballots may explain why some electronic totals were higher than the ballot totals, they do not explain why some ballot totals were higher than the electronic totals.



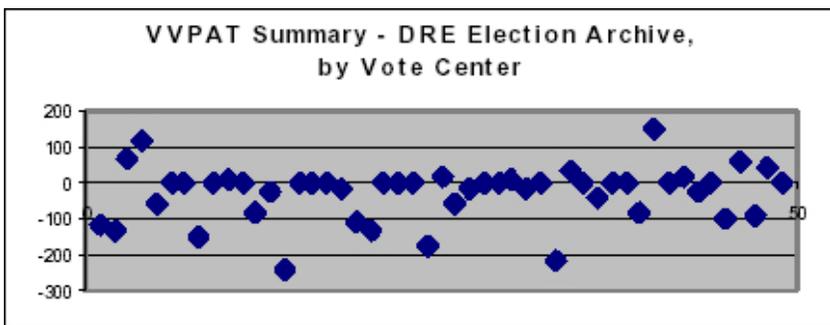
ESI’s scatter-chart on page 116 shows at least 6 vote centers where the vote totals on the VVPAT ballots were higher – by as much as 150 votes – than the electronic records.

When VVPAT totals were higher than electronic totals, did the machines print hundreds of ballots that weren’t associated with voters, did they lose hundreds of votes, or both? When the VVPAT totals were lower than electronic totals, did the machines add votes, fail to print ballots, or both?

Nor do printer errors and the loss of VVPAT ballots explain discrepancies between the VVPAT **summaries** and the electronic totals, both memory card totals and DRE archive totals.



ESI’s scatter-chart on page 113 shows many vote centers with VVPAT summaries higher, and others lower, than the **memory card** totals – by over 200 votes in some centers.

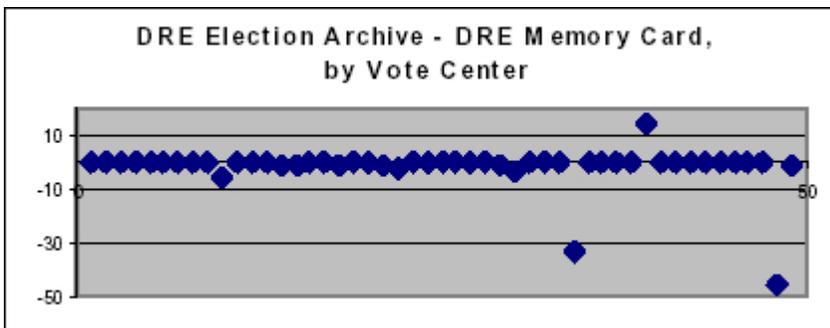


The chart on page 114 shows many vote centers with VVPAT summaries higher, and others lower, than the DRE **archive** totals – again by more than 200 votes in some centers.

- 3) **Electronic vs. electronic.** Discrepancies occurred between the two “redundant” electronic totals in **26% (twenty-six percent) of the audited vote centers**. The electronic totals in the machines didn’t match the electronic totals on the memory cards!

On page 109, the authors say, “it was found that data that should be identical were not always identical.” They explain that it is extremely difficult to determine just what the problem is when these data that “should be identical” aren’t.

“These anomalies are difficult to reconcile. They could possibly be reconciled through further forensic analysis, but one can’t be sure. The problem of reconciling individual machine vote totals is nontrivial because of the challenges involved in tracing back vote totals to individual machines. ... ”



The scatter-chart on page 117 shows that memory cards reported higher totals in some cases and, in other cases, lower than the internal memory of the DRE reported – in one vote center nearly 50 votes lower.

Since the DREs write the data to the memory cards, presumably from the data archive storage on the DREs, our question is the very one that ESI points out: “The question these data raise is why there should be any discrepancy whatsoever between the two electronic media.”

What the ESI Audit Reveals

What the ESI audit demonstrates is that the Diebold VVPAT, poorly implemented though it was, is a remarkably valuable tool for detecting problems with the performance of the machines. The audit the ESI team conducted brought to light important information that has not surfaced before.

We learned that **often** (16.2% of the time) the VVPAT summaries of the VVPAT ballots fail to match the VVPAT ballots.

We learned that, **most** of the time (72.5%), **the voter-verified paper audit trail does not match the electronic record.**

And we learned that the **redundant storage**, which DRE manufacturers claim makes their machines reliable, **isn't truly redundant storage**, because sometimes the totals that are supposed be identical are identical, and sometimes (26% of the time) they aren't.

Regarding the VVPAT Itself

In addition, we learned about the shoddy and inconsistent implementation of the Diebold VVPAT printers. On page 95 of the report, ESI details some of the many and varied problems they encountered in attempting to reconcile the totals.

Some examples of such issues and anomalies include:

- ◆ Blank VVPAT – that is, VVPATs with nothing printed on them
- ◆ Accordion-style crumpling of the VVPAT
- ◆ Inexplicable long blank spaces
- ◆ Torn VVPAT and VVPATs joined together with tape
- ◆ Printing anomalies (faded ink or irregular ink distribution)
- ◆ Text missing from VVPATs

Specifically, the report tells us, the manual count found:

- ◆ Six VVPATs (1.4 percent) of the total VVPAT Cartridges were blank. In one of these cases, the transfer case that was supposed to be used to deliver the ballots on Election Nights contained one empty canister.
- ◆ Forty-three (10.4 percent) of the VVPATs were physically compromised in any of the following ways: smeared print, torn paper, crumpled or folded paper, paper taped together, blank spaces or printer anomalies.

On page 93, ESI reports that:

2.8 percent of the VVPAT's were missing Machine ID numbers; 5.4 percent did not identify the precinct.

Diebold's disastrous implementation of the VVPAT is undeniable. And the shocking vote-count discrepancies ESI found in **every** comparison they conducted are clear evidence that Diebold's workmanship in the invisible medium of electronics is comparable to their workmanship in the visible medium of VVPAT.

The Real Threat

Several reviewers² of the ESI report have focused almost exclusively on the problems with the VVPAT, to the extent that the titles of their articles suggest the report is only about the VVPAT failures.

We believe these reviewers are missing the point of the data that surfaced during ESI's investigation. Certainly, Diebold's implementation of the VVPAT was deplorable. But worse than that, the investigation discovered that **all** the machine vote counts in the May 2006 primary were internally inconsistent and therefore thoroughly unreliable.

Significant discrepancies were found in every comparison of data that should have matched. It is impossible to know the true totals.

The Executive Summary of the ESI threat analysis, could not be more clear:

“Any issue that leads to unreliable consolidation of data is serious because thousands of votes could be lost or shifted by accident in the electronic count.”

In the electronic count!

Instead of acknowledging the certainty that future electronic totals will be so inconsistent from one medium to another that the true totals cannot be determined, Tokaji, Seligson, and Alvarez warn of compromised VVPAT ballots, printer failures, and problems with VVPAT technology.

Instead of pointing to the high risk of perverted official results, based on electronic data which has been proven to be unreliable, these three reviewers warn that recounts could be compromised since they must rely on the VVPAT ballots.

Indeed, Dan Tokaji concludes his review with this:

“Unless the mechanical and/or training issues found in the ESI report are resolved, it is quite likely that reliance on the VVPAT in recounts will lead to the wrong result in some future election.”

However, the data presented in the ESI report clearly demonstrate the real threat – **not problems caused by adding inferior VVPAT technology to DREs, but the severe internal inconsistencies in the DREs' electronic vote-total reports.** These inconsistencies cast serious doubt on all election outcomes reported by the machines – that is, whichever of the differing reports is deemed official.

The real threat is much higher than the possibility of compromised recounts. **The clear and present danger is the thwarting of the public will in the initial, official outcomes of elections entrusted to these machines.**

² Dan Seligson, Thursday, August 17, “News Analysis: The Coming Paper-Trail Debacle?”

<http://www.electionline.org/Newsletters/tabid/87/ctl/Detail/mid/643/xmid/202/xmfid/3/Default.aspx>

Michael Alvarez, Thursday, August 17, “Cuyahoga report highlights VVPAT challenges.”

<http://electionupdates.caltech.edu/2006/08/cuyahoga-report-highlights-vvpat.html>

Dan Tojaki, Friday, August 18, “ESI's Report on the VVPAT.” <http://moritzlaw.osu.edu/blogs/tokaji/>