The Paper Ballot is Not Enough.

Ben Adida
January 31st, 2017
“It’s close, let’s recount.” 😞 😞

e2e verifiable voting can provide evidence.

ignored for too long in favor of paper alone.

Paper + e2e audit trails → Evidence-based recounts!
OFFICIAL BALLOT
PRESIDENTIAL ELECTION—NOVEMBER 3, 1964

Place a mark in the box beside the names of the candidates for whom you wish to vote.

Republican
☐ BARRY GOLDWATER, President, and WILLIAM E. MILLER, Vice-President

Democratic
☐ LYNDON B. JOHNSON, President, and HUBERT H. HUMPHREY, Vice-President

Fold Here before leaving voting booth.
Help America Vote Act

From Wikipedia, the free encyclopedia

The Help America Vote Act of 2002 (Pub.L. 107–252), or HAVA, is a United States federal law which passed in the House 357-48 and 92-2 in the Senate\(^1\) and was signed into law by President Bush on October 29, 2002.\(^2\) Drafted (at least in part) in reaction to the controversy surrounding the 2000 U.S. presidential election, when almost two million ballots were disqualified because they registered multiple votes or none when run through vote-counting machines.\(^3\)

The goals of HAVA are:\(^4\)

- replace punchcard and lever-based voting systems;
- create the Election Assistance Commission to assist in the administration of federal elections; and
- establish minimum election administration standards.

HAVA mandates that all states and localities upgrade many aspects of their election procedures, including their voting machines, registration processes and poll worker training. The specifics of implementation have been left up to each state, which allows for varying interpretations of the federal law.
Exclusive: Joe Klein Grills Obama
On Petraeus, the end of easy money and his No. 1 priority

7 Things That Could Go Wrong on Election Day
Breaking machines, crashing computers, vanishing votes—are we ready for 330 million voters? If you're worried about your vote not counting, here's what you can do about it

BY MICHAEL SHERER
It’s okay, let’s have paper we can recount
How did the paper recount go in Michigan?
- Rumors of Russian interference (CIA)
- The margin was tight (0.25%)
- Candidate asked for recount (Stein)
- The money was there ($6MM)
- The deadline was met
- Experts available to help (Halderman)
- And yet....
Half of Detroit votes may be ineligible for recount

Chad Livengood and Joel Kurth, The Detroit News  2:54 p.m. EST December 6, 2016

Ingham County Clerk Barb Byrum explains how entire voting precincts may be non-recountable in the presidential election recount that began Monday in Ingham and Oakland counties. Chad Livengood, The Detroit News
MICHIGAN ELECTION LAW (EXCERPT)
Act 116 of 1954

168.871 Recount; use of electronic voting system; use of voting machines; recount of absent voter ballots; procedures for conduct of recount; use of computer; testing software application.

Sec. 871.

(1) The board of canvassers conducting a recount pursuant to this chapter shall recount all ballots of a precinct using an electronic voting system unless 1 or more of the following circumstances exist:

(a) The seal on the transfer case or other ballot container is broken or bears a different number than that recorded on the poll book, the breaking or discrepancy is not explained to the satisfaction of the board of canvassers, and security of the ballots has not been otherwise preserved.

(b) The number of ballots to be recounted and the number of ballots issued on election day as shown on the poll list or the computer printout do not match and the difference is not explained to the satisfaction of the board of canvassers.

(c) The seal used to seal the ballot label assembly to a voting device in the precinct is broken or bears a different number than that recorded in poll records and the ballot labels or rotation of candidates' names is different than that shown by other voting devices in the precinct and records of the board of election commissioners.

(2) This section does not prohibit the recounting of absent voter ballots tallied in a precinct using an absent voter counting board or
Michigan Election Record

**Tally**
- Hillary: 2,268,839
- Donald: 2,279,543

**Donald wins.**

It's close! 0.25%. Let's recount.

I guess my vote's in there somewhere.

Classic election integrity checks are very, very weak.
Michigan election director: No election hack evidence

Lansing — The state’s election director said there is no evidence that Michigan’s presidential election results were manipulated or hacked amid concern from a group of computer scientists and election lawyers about that potential.

The group is urging former Democratic presidential candidate Hillary Clinton to request a recount of the election results in Michigan, Wisconsin and Pennsylvania, according to a report originally from New York magazine. They’re concerned the election results may have been manipulated, according to the report.
We can do better!

We can have evidence baked into voting process.
<table>
<thead>
<tr>
<th>Voter</th>
<th>Candidate</th>
<th>Tally</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alice</td>
<td>Hillary</td>
<td></td>
</tr>
<tr>
<td>Bob</td>
<td>Donald</td>
<td></td>
</tr>
<tr>
<td>Carmen</td>
<td>Donald</td>
<td></td>
</tr>
<tr>
<td>David</td>
<td>Hillary</td>
<td></td>
</tr>
<tr>
<td>Erica</td>
<td>Hillary</td>
<td></td>
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</tbody>
</table>

There’s my vote!

Tally

Hillary: 2,268,839
Donald: 2,279,543

All the votes add up to declared tally!
Insights from Helios
Web-based, end-to-end verifiable
1M votes cast in 10y.
IACR, ACM, Greenpeace, Universities,...
First of many similar systems
Wombat (Israel), Agora (Spain), Coasca (Australia), DEMOS (Greece), ...
<table>
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<td>Hillary</td>
</tr>
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<td>Hillary</td>
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</table>

**Tally**

Hillary: 2,268,839  
Donald: 2,279,543
Michigan Election Record

Alice – b459e2a096
Bob – 81a40a3873
Carmen – 37f772241c
David – 658158292d
Erica – de44130da1
.....

Tally
Hillary: 2,268,839
Donald: 2,279,543
Tally Proof: b861c156c95, c8f4f2c7fe9, 4baac05668, e4212fbd5, ...

The vote trackers match the declared tally!

There’s my tracking number!
Two techniques for private vote tallying.

**Homomorphic encryption:**
Add votes under cover of encryption.

<table>
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2,268,839 2,279,543

**Mixnets:**
Shuffle & reencrypt votes, decrypt individual outputs.

Hillary  Hillary  Hillary
Bob       Donald   Donald
Carmen    Hillary  Hillary
Erica     ...      ...
Act of voting creates an audit trail that anyone can verify. Evidence for a more thorough investigation.
Travis County now taking bids for new voting system

By Calily Bien
Published: October 10, 2016, 1:17 pm | Updated: October 10, 2016, 1:17 pm
• “It’s close, let’s recount.” 😞 😞

• e2e verifiable voting can provide evidence.

• ignored for too long in favor of paper alone.

• Paper + e2e audit trails → Evidence-based recounts!
Evidence in other parts of the voting process?
Voter registration lists are public information.
Trump claims 3-5M illegal ballots cost him popular vote, cites no evidence
Let’s do some math

- 3M fraudulent / 130M cast → **2%**
- Pick 1,000 voters. Check eligibility.
- $1 - (0.98 ^ {1000}) \rightarrow 1 - 5 \times 10^{-8}$
  chance of detecting that kind fraud
- Don’t think it’s evenly distributed?
- Pick your favorite evil state, say California.
- 1M fraudulent / 18M cast → **5%**
- $1 - (0.95 ^ {1000}) \rightarrow 1 - 10^{-22}$
- Anyone can check. The DOJ. The Press. A high-schooler.
- 4 fraudulent votes in 2016.
India’s democracy reaches out to lone voter in Gujarat’s Gir forest

IANS | Apr 20, 2014, 06.17 PM IST
Democracy works only if we agree to play by some basic rules.

One of those rules is everyone gets a vote.
Q&A

@benadida      @heliosvoting

https://heliosvoting.org

#Resist